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COMPILED BY

V. L. SKITSKY

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GEOPHYSICAL ABSTRACTS 124

January-March 1946[1]

Compiled by V. L. Skitsky[2]

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1. GRAVITATIONAL METHODS

8327. Apsen, Boris. The Eötvös Torsion Balance. Its Theory and Application in Higher Geodesy (in Croatian). Hrvatska Državna Izmjera, Zagreb, No. 4, 1942, pp. 48-56.

The initial instalment of this book gives the first two chapters. These deal with the history of investigations on the shape of the earth (as revealed particularly by gravimetric methods), with the components of gravity, and with anomalies and their causes. - Hoffmann (Zagreb), Ztrbl. Geophys., Meteorol. & Geodas., vol. 10, No. 3, 1942, p. 113.

8328. Barnitzke, J. E. Bestimmung der Bodendichte durch Gravimetermessungen (Determination of Ground Density by Gravimetric Measurements). Beitr. angw. Geophys., Leipzig, vol. 10, 1942, pp. 85-95.

Gravity measurements were made along a profile in hilly country to determine the density of rocks in their natural setting. Conclusions as to probable actual density are reached by applying the Bouguer correction based on differences in densities. - V. S.

329. Coster, H. P. The Gravity Field of the Western and Central Mediterranean. Bij J. B. Wolter, Groningen, Batavia, 1945, 57 pp., maps.

The gravity data of the western and central Mediterranean are presented d discussed. They include the observations of the expeditions of Veninginesz made during 1923-36 on the ships "Vettor Pisani", "Fresnel", and spoir", as well as the free-air and isostatic anomalies, and the reductions f stations at Trapani and Cagliari. Seismic and geological evidence is so considered. It is found that the general distribution of positive and gative anomalies follows the pattern of the Netherlands East Indies. Posiive anonalies predominate; they are not eliminated by isostatic reductions d must be explained by the existence of abnormal masses, as in the Indies. his interpretation, the author attributes these anomalies only in part connection currents. Other processes also must have played a role in e sinking of the Mediterranean deep-sea basins during the Neogene and uarternary. These would explain the compensation of the basins found to ke place at a depth of some 30 km. - V. S.

330. De Lury, J. S. Outline of a Hypothesis to Explain Crustal Movements. Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 39, 1945, pp. 1-11; List and Minutes 1945, p. 149.

The main ideas contained in a number of the writer's papers on rustal problems are correlated to provide an outline of a fairly complete ypothesis of earth movements. The concept of a thick crust as opposed to e shallow, weak shell assumed in isostatic theory leads to the views at crustal failure is a very protracted process and that magmas are not herited but are generated by frictional heat in comparatively shallow vels within the crust. Thermal contraction is used to supply the forces r the mechanism of failure, but the classic theory of the manner of ailure is abandoned. - Author's abs.

331. Field, R. M. F. A. Vening Meinesz - A Geodesist's Contribution to Geoscience. Nat. Res. Council, Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 2, 1945, pp. 183-189.

The geophysical surveys of the ocean bottom made by F. A. Veningeinesz during 1923-34 and his research and theoretical work are outlined nd discussed in the light of isostasy. Particular attention is devoted the exploration of the linear belt of negative gravity anomalies in he East Indian Archipelago, which is produced by a deficiency of density xpressed in the islands and oceanward throughs of that region. The view s taken that Meinesz's hypothesis of the tectogene may be eventually modiied or replaced, but that his discovery of the anomaly belt will remain he greatest advance in the application of gravitational physics to geology ince the detection of the deflection of the vertical. Basic references re given on the gravimetric phases of marine geophysics and structural eology. - V. S.

8332. Hasselmann, K. F. A Technique for Making Torsion-Balance Surveys in Inundated Areas. Bull. Univ. Missouri Sch. Min. Met., Rolla, Mo., Tech Ser., vol. 16, No. 2, 1945, 31 pp.

Field operations in regions where shallow-water areas existed demonstrated a need for a method of exploring these and similar areas. After conside able experimental work, a tripod and float were designed and constructed tha made torsion-balance surveys of these areas possible. Extensive torsion-balance surveys of Galveston Bay in Texas and Barataria Bay in Louisiana led to the discovery of several oil fields. The method makes possible gravit exploration of inundated areas throughout the world. - Author's abs.

8333. Hubbert, M. K. Some Physical Considerations Bearing upon the Theory of Isostasy. (abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 455.

Although the theory of isostasy, as a generality, has by now gained virtually universal acceptance among the students of the earth, there is as yet no comparable agreement as to the significance of isostasy in various geological processes and of what phenomena may or may not be ascribed to isostasy as a cause.

The purpose of this paper is to review some of the physical aspects of the isostasy problems and to deduce criteria for distinguishing between those phenomena that are manifestations of isostasy and others that are not. These criteria will be in part mechanical and in part thermodynamical. By this means, it will be shown that diastrophism (including volcanism) and erosion are the truly fundamental dynamical processes of the earth, in comparison with which isostasy is but a minor and secondary adjustment phenomenon.

8334. Miller, A. H. Gravimetric Surveys of 1943 in New Brunswick (abs.). Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 38, 1944, List and Minutes, p. 159.

Several exploratory traverses with a torsion balance by the Dominion Observatory in collaboration with the Geological Survey of Canada and the Department of Lands and Mines of New Brunswick tend to confirm the previously presumed existence of a buried anticlinal structure between Portage Vale and Coverdale, a distance of some thirty miles. Large negative anomalies of gravity between Portage Vale and Sussex may be due to the possible occurrence of salt, gypsum, or bituminous shales. A magnetic "high" was traced between Indian Mountain and Shediac Bay but no definite indication of an easterly extension of the Calhoun magnetic anomaly was observed at rather widely spaced stations on two traverses running south from Barachois and Cape Bald.

8335. Tanni, L. On the Isostatic Structure of the Earth's Crust in the Carpathian Countries and the Related Phenomena. Ann. Acad. Sci., Fennicae, Helsingfors, A 3, vol. 4, 1942, pp. 1-100.

A study has been made of isostasy in Carpathian countries on the basis f Polish, Hungarian, Austrian, Rumanian, Balkan, Black Sea, Eastern Alps, nd North Italian gravity data. The anomalies were computed according to he international formula for gravity. Reductions were made by the free-ir, Bouguer, and Airy-Heiskanen methods. The results are tabulated, and he isostatic anomalies are shown on three maps.

The maps reveal several regularities: (1) One narrow strip of low-ravity values borders the western Carpathian mountains, continuing apparently long the middle and eastern Carpathians. Another such strip borders the ussian plateau and joins the first strip south of Lwow. The junction is arked by an especially low gravity-minimum. (2) The Hungarian plain does ot have as uniformly positive values, as the old measurements seemed to ndicate. The new gravity distribution generally agrees with the conception f isostatic equilibrium. Other features of the maps are described. The onclusion is reached, that the chief reason of isostatic anomalies lies n a different thickness of the upper layers of the earth's crust. The study contains an appendix on the isostatic anomalies in entire Europe. - V. S.

8336. Vening-Meinesz, F. A. Gravity over the Hawaiian Archipelago and over the Madeira Area; Conclusions about the Earth's Crust. Proc. Ned. Akad. Wet., Amsterdam, vol. 44, No. 1, 1941.

The author points out that both the Hawaiian Archipelago and the Madeira area of volcanic origin are situated in deep-sea regions. He assumes that each group of islands has an average density of 10 to 15 percent greater than the surrounding rock, extending from the level surface of the surrounding deep-sea ocean-bottom to the surface of the islands. These heavy island masses are assumed to be regionally compensated; depth of compensation, 30 km.

The author finds that for a depth of compensation of 30 km. the average anomaly is a minimum for 3.07 density of island masses when the radius of the region of compensation is 174.3 km., or for 2.937 density when radius is 232.4 km. The average anomalies, without regard to sign, for the five areas considered are 15 and 11 milligals, respectively, whereas for local compensation and 30 km. depth of compensation the respective average anomalies are 88 and 81. - J. A. Duerksen.

8337. Woollard, G. P. Gravity Observations in the Maritime Provinces. Nat. Res. Council, Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 2, 1945, pp. 191-196.

A gravity survey was carried out during 1944 in the Maritime Provinces of Canada. Observations made with an X-type gravimeter at 521 stations and corrected for the effects of latitude, elevation, and mass above sea level furnished the Bouguer values of anomalies for constructing isoanomaly contour maps. The results reveal a complex gravity field, particularly in central and northern New Brunswick, the Gaspe Peninsula, and southern Nova Scotia. Zones of marked positive anomalies stretch along the St. Lawrence River parallel to the Bay of Fundy and alternate with isolated areas of negative anomalies in other sections. They appear to reflect both deep-seated and near-surface lithologic variations typical of the Blue Ridge-Huston

Valley low, observed to extend from Virginia into northern New England. These and other geological correlations are discussed, with illustration by gravity-anomaly maps and sections. Further surveys are proposed. - V. S.

2. MAGNETIC METHODS

8338. Barta, G. The Temperature Correction for the La Cour Magnetic Balance (in Hungarian). Időjárás, Budapest, vol. 45, 1941, pp. 197-201, 227-228.

In the La Cour magnetic balance a variation of temperature produces a change of magnetic moment. The author formerly discussed the theoretical possibility of a correction by optical devices. In the present paper he describes such an arrangement. The influence of temperature upon the instrument is nullified by means of a bi-metal thermometer which responds to change by a curving of the bi-metal. The curvature modifies the path of light rays projected on a prism and effects a compensation of measurements for the temperature. Two diagrams demonstrate that the mechanical design fully satisfies theoretical requirements. - V. S.

8339. Cattala, L., and Rothé, J. P. Prospection magnétique sur le mineral de fer de la mine de Puymorens (Magnetic Prospecting of the Iron Deposit at the Puymorens Mine). Ann. Inst. Phys. Globe 1938, Mende, France, n. ser., vol. 3, pt. 3, 1941, pp. 120-126.

A magnetic survey has been made at the Puymorens iron mines situated in the eastern Pyrenées near the border of Andorre. Local geology and topography are described. The vertical component of the geomagnetic field was measured by means of a Schmidt's balance over a relatively small number of stations owing to limited time. The results showed two zones of major positive anomalies. The larger one, situated at an altitude of more than 2,150 meters, extended beyond the limits of the known deposit and ranged from 1,000 to 2,000 gammas. The smaller zone to the southwest ranged between 1,500 and 2,000 gammas. To the north and northwest of the positive anomalies, a zone of negative anomalies was detected that exceeded 1,500 gammas. More detailed exploration, including measurements of the horizontal component and declination, is recommended. - V. S.

8340. Deel, S. A. Alaska Magnetic Tables and Magnetic Charts for 1940. U. S. Coast and Geod. Surv., Washington, D. C., MD-8, 1944, 42 pp.

The present publication contains all available results of observations on declination, dip, and horizontal intensity made in Alaska and adjacent regions from 1870 up to and including 1941, with corresponding values for January 1, 1940, except that in case more recent observations were made at any station, the earlier observations have been omitted. As before, charts for declination, depth, horizontal intensity, and vertical intensity are included. - Author's abs., abridged by V. S.

41. Evrard, P., and Koenigsfeld, L. Lévé geomagnétique du Salmien superiéur manganésifere de la vallée de la Lienne (Magnetic Survey of Manganese-Bearing Superior Salmien in the Valley of the Lienee). Ann. Soc. Géol. Belgique, Liége, vol. 67, No. 2, 1944, pp. 473-494.

A magnetic survey was made of a manganese deposit in the valley of e Lienne. The deposit lies imbedded in the superior Salmien, upper mbrian layer, which has very weak magnetic susceptibility. The survey, egun with a Schmidt balance uncompensated for temperature variations, d to be resumed with a compensated La Cour balance which also responded external temperature because of faulty construction but could be adjusted. hermal corrections are discussed mathematically.

The magnetic measurements were found to vary within a small range and be inconclusive as to the deposit. The largest anomaly, near Bierleux, eached a negative maximum of only 160 gammas; its theoretical equation ndicated variation between negative and positive values. However, some ndications were gained on geological configuration. The laboratory tests f local rocks, accompanying the measurements, gave very low coefficients f induced magnetic emanation. It is concluded that when metal deposits re embedded in rocks of very weak magnetic susceptibility, the magnetic ethod may be useful only for geological reconnaissance. The report ontains critical appraisals by Dehalu, de Magnée, and Fourmarier. - V. S.

342. Fleming, J. A. Summary of the Year's Work, to June 30, 1945, Department of Terrestrial Magnetism, Carnegie Institution of Washington. Terr. Magn. Atm. Elect., vol. 50, No. 4, 1945, pp. 279-286.

The war has rendered impossible the normal program of the Department ecause no expeditions could be sent to foreign lands or on the oceans to ather secular variation and other data. Moreover, the personnel engaged lmost entirely in war work. Still, some important previous research was rought to conclusion. The activities reported for the year July 1, 1944, o June 30, 1945, are reviewed under the following headings: (1) Geomagetic investigations, (2) terrestrial electricity, (3) ionosphere, 4) nuclear physics, (5) observatory and field work, and (6) publications. - . S.

343. Gelfand, I. S. Direct and Inverse Problem of the Magnetic Potential for a Spherical Segment (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 5, 1944, pp. 292-294.

This paper gives formulas for the magnetic potential and the components f the magnetic force in the subsurface strata. These formulas have the form of a spherical segment in the case of uniform and direct magnetization. A method based upon the solution of the direct problem is suggested for the determination of the stratum of the spherical segment. It makes use of the observed values of horizontal and vertical components of the magnetic force at a known intensity of magnetization of rocks. - English summary by author.

8344. Ising, G. On the Magnetic Properties of Varved Clay. Ark. Mat. Astr. Fys., Stockholm, 29A, 1, No. 5, 1943, 37 pp.

It is suggested that varves containing ferromagnetic minerals should show anisotropic susceptibility acquired during sedimentation in the earth's magnetic field and thereafter unaffected by aging. This anisotropy should thus be a better record of the secular variation of the earth's field than the remanent moments, which may alter with time.

A series of varves from southern Sweden is examined, and such anisotropy is found, the minimum of susceptibility being in the vertical direction. Determination of the maximum susceptibility, however, is beyond present instrumental equipment. The direction of the remanent moment is nearly the same as that of the present field. The magnetic properties of the clay vary with distance of sedimentation from the ice border, and an annual period is found in the content of magnetic matter, the parts deposited in spring being several times more magnetic than those settling out in winter. The instruments used are described: they include an electromagnetic induction balance, a series of torsional magnetometers, a magnetic bridge, and a pendulum magnetometer. - A. Hu., Phys. Abstr., vol. 48, No. 568, 1945.

8345. Johnston, H. F. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for April to June and July to September, 1945. Ter. Magn. Atm. Electr., Baltimore, Md., vol. 50, 1945, No. 3, pp. 237-240; No. 4, pp. 315-318.

Tables are given with explanatory text. - V. S.

8346. Kelly, S. F. Warning Re Geophysics. Nor. Min., Toronto, vol. 31, No. 27, 1945, p. 26.

The author cautions against arousing undeserved public mistrust through incompetent use of magnetic prospecting methods. There have been instances of this recently when prospecting was made for nonregistering minerals under unsuitable conditions and on overextended grids. Certain established facts about what can and cannot be done must be used for guidance. Iron ores can be detected successfully. Rock formations possessing different magnetic permeabilities offer adequate conditions for tracing contacts, shears, faults, folds, intrusions, etc., when close grids are used; subsurface mapping often leaves no other alternative. On the other hand, the pyrrhotitic sulfides require that magnetic surveys be checked electrically. Nonpyrrhotitic sulfides can not be detected at all and necessitate electrical methods. - V. S.

8347. Knapp, D. G., and Howe, H. H. Magnetic Observatory Results at Tucson, Ariz., for 1935-36. U. S. Coast and Geodetic Survey, Washington, D. C., MO 20, 1944, 122 pp.

This publication contains extensive tables of observatory results,
eproductions of magnetograms showing the more important magentic storms,
d an explanatory text. The tabulated results include hourly mean
alues of the magnetic elements D, H, and Z, summaries of their monthly
d annual means, collected mean diurnal variations for each month, season,
d year, lists of principal magnetic disturbances, amounts of noncyclic
ange, observed and adopted base-line values of the D, H, and Z vario-
eters with their abrupt changes, etc. The text includes a description of
nstruments, discussions of their coefficients and behavior and of the
rocedures used, and explanations of the various tables. - Authors' abs.

348. Meyer, O. Einige Tabellen über die erdmagnetischen Registrierungen in Observatorium Wingst im Jahre 1940 (A Few Tables of Terrestrial Magnetism Records at Wingst Observatory in the Year 1940). Ann. Hydrogr., Berlin, vol. 70, 1942, pp. 260-263.

A brief account is given of the activities of the magnetic observatory
t Wingst, Germany, during 1940. Information on the instruments employed
ncludes the scale values and temperature coefficients of variometers. The
ata on D, H, Z, and I are tabulated as selected averages for different
eriods of time and different conditions of weather. Certain normal values,
ecular variations, and character figures are presented. - V. S.

349. Mining Journal, Phoenix, Ariz. Magnetometer Proved to be Valuable in Oregon Tests. Vol. 29, No. 10, 1945, p. 45.

A summary is given of the report of E. L. Stephenson on a survey carried
ut in 1942 on the black sands of the Oregon southwestern coast. It was
ade by the U. S. Bureau of Mines in conjunction with the Oregon Department
f Geology and Mining Industries to test the efficiency of magnetic methods
see Geoph. Abs. 123, No. 8219). - V. S.

350. Molin, Kurt. A General Earth Magnetic Investigation of Sweden Carried Out During the Period 1928-1934 by the Geological Survey of Sweden, parts 3-4, Horizontal Intensity, Vertical Intensity, and Horizontal Disturbing Force. Sveriges Geol. Undersökning, Stockholm, ser. Ca, No. 33, 1941, 105 pp.; No. 34, 1942, 104 pp.

The series of reports on the general geomagnetic investigation of
weden during 1928-34 is continued. Issues 3 and 4 deal with horizontal
ntensity, vertical intensity, and the horizontal disturbing force. Table
nd maps are given with explanatory text. Their scope and presentation
ollow closely those adopted in issues 1 and 2 on declination and inclina-
ion (see Geophys. Abs. 89, No. 3685, and 99, No. 5183). - V. S.

351. Richards, M. E. Magnetic Surveying in Progress in Missouri Iron Ore Areas. Skillings Mining Review, Duluth, Minn., vol. 34, No. 38, 1946, pp. 1, 11.

Several magnetic surveys were made recently in the region of Iron Mountain and Pilot Knob, southeastern Missouri. (1) In a locality near Bourbon, a magnetic anomaly registered 4,000 to 6,000 gammas over an area of 1 square mile. Three holes were drilled through approximately 1,500 feet of sedimentary rock, limestone, sandstone, and porphyry until the latter showed iron ore. (2) In another locality, between Pilot Knob, Iron Mountain, and Bourbon High, a magnetic anomaly averaged about 10,000 gammas. It stretched along a general strike in line with these mining towns and suggested, by its position, the existence of an iron belt in this region. Porphyry outcrops are found here on three hills, and the local geology resembles that of the Iron Springs mining district in Utah. No drillings have been made. - V. S.

8352. Scott, W. E. Mean K-Indices from Thirty Magnetic Observatories and Preliminary International Character-Figures for 1944. Terr. Magn. & Atmos. Elect., Baltimore, Md., vol. 51, No. 1, 1946, pp. 67-73.

Tables are given with explanatory text. The year 1944 was comparatively quiet; there were moderate magnetic storms on April 2 and December 16-17 and disturbances in February, March, August, and October. No perfectly calm 3-hour interval occurred. - V. S.

8353. Terada, K. Electromagnetic Induction Within the Earth's Crust of Variable Conductivity. Jour. Meteorol. Soc. Japan, Tokyo, vol. 17, 1939, pp. 17-18, 191-198.

The magnetic potential in the earth composed of many concentric spherical shells of different electric and magnetic properties is mathematically calculated when the earth is sounded by a nonconducting atmosphere. The formulae are simplified in some special cases. From the results of calculation, it is found that the vertical magnetic force does not change appreciably by a rapid periodic change of the magnetic field, and that a sufficiently thick spherical shell can almost prevent the penetration of periodic magnetic induction. When the change is aperiodic, no conclusive results are obtained. - Y. Kodaira, Ztrbl. Geophys. Meteorol. Geodäs., vol. 5, 1940, pp. 19-20.

8354. Umbgrove, J. H. F. Recent Theories on Polar Displacement. Amer. Jour. Sci., New Haven, Conn., vol. 244, No. 2, 1946, pp. 105-113.

New theoretical considerations on large polar displacements were published by a few Dutch authors during the past war years. A synopsis, in English, of the principal points of these new hypotheses is desirable, because two papers are in the Dutch language and one, moreover, is a thesis. In his discussion of the subject, the present author gives his motives as to why he thinks the new theories on large polar displacement, as well as their predecessors, are unsatisfactory and should be abandoned. - Author's abs.

355. Walton, M. S., Jr., and Kennedy, G. C. Magnetic Exploration of the Nickel-Copper Deposits of Bohemia Basin, South-Eastern Alaska. Econ. Geol., Lancaster, Pa., vol. 40, No. 7, 1945, pp. 496-502.

The Bohemia Basin nickel-copper deposits are segregations of pentlan-ite, pyrrhotite, and chalcopyrite in the lower portions of a norite mass, he bottom of which is basin-shaped. Eight traverses were made with an skania vertical intensity magnetometer across the projected position of he deposit beneath a covered area. Magnetic anomalies were observed at he inferred position of the deposit along six of the traverses and indicate hat the body is continuous beneath most of the covered area.

Magnetic profiles are consistent with the hypothesis, proven at two laces by outcrops and drill holes, that the deposit dips inward. The rofiles and outcrops indicate that the deposit averages about 80 feet in hickness. The profiles also suggest that the deposit, under the covered rea, extends down the dip for a distance greater than its thickness, and hat the muskeg cover is not deep. These inferences are consistent with vailable drill data. The inferred quantity of sulfide-bearing material in he deposits was increased from 5,000,000 tons to 8,500,000 tons by the results of magnetometer exploration. The magnetic data will facilitate lanning of any future development of the deposits and would have been seful in the more effective placing of some of the holes already drilled. - Authors' abs.

8356. Wenner, Frank. Gauss's Method of Measuring the Horizontal Component of the Earth's Magnetic Field. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 2, 1946, pp. 164-167.

This paper makes use of a discussion of Gauss' method of measuring the horizontal component of the earth's magnetic field as a means for presenting those ideas concerning the nature of magnetic quantities which have been promulgated by the International Electrotechnical Commission. Reference is also made to the actions taken or initiated by that commission relative to the fundamentals of measurements of mechanic, electric, and magnetic quantities. - Author's abs.

8357. Wulf, O. R. On the Relation Between Geomagnetism and the Circulatory Motions of the Air in the Atmosphere. Ter. Magn. Atm. Electr., Baltimore, Md., vol. 50, No. 3, 1945, pp. 185-197.

Variations of the geomagnetic field are discussed in relation to the circulatory motions of the air in the atmosphere. It is pointed out that large-scale circulation in the altitudes of the diurnal wind system of the dynamic theory must contain both zonal and meridional components and is subject to similar variations as the air flow in the lower atmosphere. The prevalence of a strong upper circulation could explain a considerable portion of the behavior of the geomagnetic elements from hour to hour, day to day, and month to month. It could also have an important bearing on the origin of the earth's field and its secular variation. Possibly, magnetic disturbances may be traceable in part to the fluctuations occurring in this upper circulation. - V. S.

8358. Wulf, O. R.--A Preliminary Study of the Relation Between Geomagnetism and the Circulatory Motions of the Air in the Atmosphere. Terres. Magnet. Atmos. Elec., Baltimore, Md., vol. 50, No. 4, 1945, pp. 259-278.

Comparison is made of different forms of the daily traces of the geomagnetic elements with large-scale atmospheric pressure patterns near the base of the stratosphere over an area in which the magnetic observatory lies, in a preliminary study along lines suggested by the considerations in an earlier article. Illustrations are given of a few daily examples, but the comparison is made by obtaining the averages of the magnetic elements and of certain characterizing features of the pressure patterns for two groups of days equal in number for all of the days of each of 14 months. Comparison is also made of the daily values of magnetic disturbance (K-sums) with a measure of the change of pressure pattern over the day for the days of the same interval. It is concluded that the data, at least as presented in this preliminary study, do not afford reliable indication of a relation between geomagnetism and the circulatory motions of the air in the atmosphere. - Author's abs.

3. SEISMIC METHODS

8359. Adler, J. L. Notes on Formulation of Seismic Velocity. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 457.

A method is presented for determining, from reversed refraction profiles, the best-fitting value of the factor K where $V = V_0 + KZ$. Charts are included which reduce to a few minutes the time required for the computation. Velocities determined by well shooting support the following conclusions:

. Use of this formula in lieu of actual interval velocities to simplify both refraction and reflection computing generally introduces little error within the vertical limits of the data to which the factor K has been fitted. Extrapolation of the velocity curve may result in gross inaccuracy, and a logarithmic type of curve fitted to available well shooting or $T-\Delta T$ data affords a better basis for extrapolation. After such extrapolation, an over-all best-fitting value for K can be determined that will produce less error than the value of K determined strictly in the region of observed data.

8360. Barthelmes, A. J.. Application of Continuous Profiling for Refraction Shooting. Geophysics, Menasha, Wis., vol. 11, No. 1, 1946, pp. 24-42.

A method of refraction shooting is developed for the purpose of investigating subsurface structures by utilizing the principle of continuous profiling now generally in use for detailed and more accurate reflection surveys.

The basic assumptions and the general theory, which will allow individual depth determinations for all geophone locations, are discussed. The practical application is illustrated with sample records and cross sections.

veral field techniques, as well as efficiency with regard to accuracy, roduction, and cost, are discussed and analyzed. - Author's abs.

361. Born, W. T. The Attenuation Constant of Earth Materials, II. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 450.

The internal friction in a number of rod specimens of consolidated cks was measured by a dynamic method previously described. The losses n water-free specimens were found to be substantially independent of requency, whereas rocks containing moisture showed, in addition, losses ncreasing with frequency. The logarithmic decrement of dry rocks ranged rom 0.005 for a specimen of Italian marble to approximately 0.05 for ndstone specimens. (For pt. I, see Geophys. Abs. 106, No. 6154. - V. S.)

362. Cagniard, L. Quelques résultats d'une étude théorique de la réflexion et de la réfraction des ondes séismiques progressives (Some Results of a Theoretical Study of the Reflection and Refraction of Progressive Seismic Waves). Ann. Inst. Phys. Globe, 1938, Mende, France, n. ser. vol. 3, pt. 3, 1941, pp. 106-116.

In 1904, Lamb showed that theoretical seismology should investigate ropagation of a signal, rather than propagation of harmonic conditions. roceeding on simplified assumptions, he studied the surface propagation f waves generated by a surface-point source. The author generalizes Lamb's esults by applying them to two elastic media and a point source situated t depth. A solution is sought for propagation in both media and in the ntervening plane surface that would account for factors of transmission, lternatives in the relation between wave velocities, superficial pseudo-aves, and spherical pseudo-waves of distortion. Fourier's integrals are voided with a view to attaining perfect mathematical rigour. The discussion s illustrated by diagrams of reflection and refraction in different hases of propagation. - V. S.

363. Canadian Mining and Metallurgical Bulletin. Petroleum and Natural Gas. Montreal, No. 401, 1945, pp. 499-500.

According to a recent report of the Alberta Petroleum Association, 5 seismograph parties are now working in Alberta, representing 11 companies, hich to date is the largest number active there at one time. Although, n the past, seismograph surveys have not proved particularly successful n the plains of Alberta owing to the variable thickness of glacial drift, ome success is indicated by the results obtained in the Jumping Pound rea in the Foothills belt and also in the Princess area. The future may ring important discoveries of buried structures suitable for petroleum ccumulation. During the summer of 1943, the Dominion Government completed seismic survey in Wainwright area, and, as a result, three structures were ndicated, the most promising of which appears to be the Vale Dome.

8364. Cody, M. C. Richmond Exploration Has Active Campain Started in Venezuela. Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 18, 1945, p. 77.

The Richmond Exploration Co., subsidiary of Standard Oil of California, has acquired concessions in Venezuela and started surveys which include seismic work. The holdings designed for exploration cover 1,152,000 hectares and are divided into the Zulia concessions and the Reco concessions. The Zulia group has in the field four scouting parties, two seismograph parties, and one geological party. - V. S.

8365. Cowles, L. G. The Narrow-Band Resistance-Coupled Amplifier. Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, pp. 394-405.

A method for the design of the amplifier coupling circuit is presented in a form permitting the selection of circuit constants directly from a specified band width, peak frequency, and peak-frequency coupling loss. The design procedure is illustrated by several practical examples; the limitations of the narrow-band amplifier are discussed. - Author's abs.

8366. Dix. C. H. The Interpretation of Well Shot Data: Simplest Cases of Lateral Velocity Variation. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 456.

The case of the linear velocity-depth relation $V = V_d + az$ is generalized to include bx, giving the lateral variation. By a rotation of coordinates through an angle $\theta = \tan^{-1} (b/a)$, $V = V_d + az + bx$ becomes $V = V_d + (a/\cos \theta)z$. If one well is shot from several shot points in line, the horizontal distance from the well to the place where the line of centers of ray circles intersects a shallow level datum is approximately $(1/2)(z^2/d)$, where d is distance from well to point on datum corresponding to minimum travel time from points on datum to well point at depth z. The approximate height of this line of centers at the well can be found so we can find the tilt of the datum. More general cases are discussed. (For the preceding paper, see Geophys. Abs. 122, No. 8089. - V. S.)

8367. Fillippone, W. R. Depth-Displacement Slide Rule. Geophysics, Menasha, Wis., vol. 11, No. 1, 1946, pp. 92-95.

A slide rule is described, based upon formulae for circular arc ray paths, to compute depth and displacement of seismic reflectors when time of reflection, angle of dip and velocity-depth distribution are known. The rule may be used to compute horizontal and vertical displacement for reflectors on point-plotted sections if dips do not exceed 5 degrees. An alternative is a modification of a standard log-log trig slide-rule, which serves the same purpose. - Author's abs.

368. Fu, C. Y. Studies on Seismic Waves: I. Reflection and Refraction of Plane Waves. Geophysics, Menasha, Wis., vol. 11, No. 1, 1946, pp. 1-9.

By taking the apparent velocity along the boundary as the parameter instead of the angle of incidence, the equations for the different wave amplitudes may be put in more symmetrical forms. In this way, it is more convenient to discuss both the body waves and the Rayleigh waves at the same time. A defect of plotting the square root of the wave intensity against the angles is also discussed. When the reflection or refraction coefficient is not real, the meaning of the intensity, as obtained by squaring the absolute value of the latter quantity, needs clarification. - Author's abs.

8369. Fu, C. Y. Studies on Seismic Waves: II. On Rayleigh Waves in a Superficial Layer. Geophysics, Menasha, Wis., vol. 11, No. 1, 1946, pp. 10-23.

Lamb's method in the theory of the plate is extended to the case in which one of the surfaces is not free. The resulting determinantal relation is similar to that of Sezawa. It is then simplified, and special cases of the frequency-velocity relation are discussed. Even when the thickness of the layer is as small as a wave length, the interaction of the upper and lower boundaries of the layer is quite slight, and Rayleigh waves and Stoneley's waves may be discussed separately. A few points in connection with the application of this frequency relation to the ground-roll problem also are discussed. - Author's abs.

8370. Geyer, R. L. Combined Surface and Seismic Exploration Party. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 12, 1946, pp. 1781-1782.

In exploring petroliferous deposits, geological and seismic parties often work simultaneously but independently. This practice results in a duplication of surveying and a failure to correlate data. The author proposes a combined geological-seismic party under a single chief. The personnel of both units is put together and a junior geologist is added. The latter is to study outcrops, test shot-hole samples, and correlate these with seismic data. If a portable laboratory is provided, this work can be done in the field. The organization of such a party is illustrated by a diagram and its advantages are discussed. - V. S.

8371. Harris, Sidon, and Peabody, Gwendolyn - Refraction Exploration in West Texas. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 454.

A brief historical summary of refraction shooting is given, with special emphasis on western Texas. A general discussion of more recent techniques is presented with a few simplified methods of computation as applied to the Edwards Plateau and other localized areas in western Texas. A brief description of field problems and techniques is given.

8372. Hoylman, H. W. Seismograph Evidence on the Depth of the Salt in Southeast Texas. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 450.

Reflection seismograph records shot over the top of the shallow Moss Bluff Salt Dome, Chambers County, Texas, show bands of energy which can be reasonably identified as reflections from the base of the salt. Depth calculations place the bottom of the salt mass at approximately 16,000 feet. Later events on the records are either reflections from the basement complex or multiple reflections. Assuming they are from the basement, the depth is calculated as approximately 25,000 feet. Alternatively, the time relations can be fitted closely in terms of multiple reflections between the base of the salt and the interface at the contact of the cap rock with the overlying sediments where the velocity discontinuity is a maximum.

8373. Jones, W. M. The Use of Differences of Arrival-Times of P as an Aid to Epicentral Determinations in the South Pacific. N. Z. J. Sci. Tech., Wellington, vol. 26 B, 1944, pp. 146-154.

Curves have been drawn covering the more important seismic portions of the South Pacific, showing the differences in P-arrival times between Wellington and Brisbane and between Wellington and Suva, Seismological Observatories, for a normal and for a deep-focus earthquake, according to Jeffreys and Bullen's 1940 Tables. Other curves show the distances from these observatories to points over the same area. The plotting is on a Mercator projection. The use of such curves in determination of epicenters is briefly discussed. The effects of focal depth are illustrated by diagrams, which show the magnitude and direction of the displacement of epicenters when normal focus is assumed for a deep-focus earthquake, and two methods are indicated by which a good approximation to an epicenter can be found directly from the P-arrival times at four or more stations without making any assumption of focal depth. - C. J. G., Phys. Abstr., vol. 48, No. 572, 1945.

8374. Jones, W. M. Note on a Table of Distances from South Pacific Seismological Observatories. New Zealand Jour. Sci. Tech., Wellington, vol. 27, No. 2B, 1945, pp. 163-166.

A table has been compiled, mainly for seismological purposes, giving, in degrees and minutes, the "geographical" distances from five South Pacific observatories to points, at intervals of 1 degree in latitude and longitude, in the South Pacific region, from 0° to 35° south latitude and from 160° east to 170° west longitude. A sample sheet only is printed here as basis for a brief discussion of the table. - Author's abs.

375. Kendall, J. M. Airplane-Noise Interference with Seismic Prospecting. Geophysics, Menasha, Wis., vol. 11, No. 1, 1946, pp. 82-91.

The low-frequency sound produced by airplanes is briefly investigated, nd its propagation through the atmosphere is considered. Data on a cargo-ype airplane are presented. Rough calculations to determine the response f geophones to this sound field indicate that one airplane can blanket n area of several hundred square miles. Measures suggested for minimizing he interference are discussed. - Author's abs.

376. Kugler, H. G., Mackenzie, S. C., Stainforth, R. M., Griffiths, J. C., and Brotherhood, G. R. Report on Exploration for Oil in British Guiana. Geol. Surv., Br. Guiana, Georgetown, Demerara, Bull. 20, 1942 (1944), 78 pp. Price, $1.00.

In 1939 a seismic survey was made in the Berbice basin of the coast of ritish Guiana. It aimed at determining the thickness of sediments and scertaining whether any well-bedded sediments existed between the unconsolidated layer and the basement. The method consisted of reversed efraction profiles combined in suitable localities with reflection traverses.

The results revealed a structure at Rose Hale, and a test well was unk in 1941. Boring reached the basement between 6,310 and 6,410 feet, hereas seismic velocities of 18,400 feet had placed it at 6,420 feet. ome encouragement was derived from the considerable thickness of the sediments and an intermediate velocity bed indicating a possible Cretacean ormation of the type carrying oil in the Orinocco basin. However, the ests proved to be disappointing; the velocity bed was actually a conglomerate, and only heavy oil showed up at some 6,074 feet. Thereupon, exploration was discontinued.

Nevertheless, the authors do not discount the possibility of oil on the Guiana coast. In the light of theories on the existing oil traces, the chances seem greatest for the continental shelf off the northern shore. (Reviews of this paper appeared in Bull. Imp. Inst., London, vol. 43, No. 3, 1945, pp. 243-245, and Bull. Am. Assoc. Petrol. Geol., vol. 30, No. 1, 1946, pp. 120-121). - V. S.

3377. Leet, L. D. A Three-Component Portable Seismograph for the Measurement of Vibrations. Nat. Research Council, Trans. Am. Geophys. Union, Washington, D. C., vol. 26, pt. 1, 1945, pp. 33-36.

Described is a portable seismograph having a weight of 65 pounds and dimensions of 12 by 14 by 19.25 inches. It gives a record directly proportional to displacement for vibrations of a frequency of three cycles per second or more , and a magnification of 25 yielding a full registration from about 0.0005 to 0.035 inch.

The construction is a mechanical-optical system damped magnetically, with inertia elements suspended by flat springs. Its connection with the recorder is effected by means of a beam of light traveling to a condensing lens placed above three fixed mirrors. A concave mirror on the horizontal component receives from its fixed mirror a rectangular patch of converging light, with the long axis vertical, and returns an upright image to the face of the outer of two long plane mirrors. Therefrom the beam travels by 11 reflections to a cylindrical lens which brings it down to a point and transmits it on to the surface of the photographic paper for registration. For the vertical component, the path of the beam is slightly different. Operation of the instrument is described. - V. S.

8378. Lyons, P. L. The Low Velocity Layer in Seismic Exploration. Min. Mag., Denver, Colo., vol. 35, No. 10, 1945, pp. 546-548, 591.

The presence of a low-velocity layer (lvl) interferes with seismic records. Lvl can be defined as a variable surface layer of the land crust, within the elements of which the velocity of compressional waves is abruptly less than that of rocks below, usually less than 5,000 feet per second. As such, it should not be identified with the geological weathered, aerated surface, or definite unconsolidated layer. The layer's constituent elements and properties, the average lvl velocity (V_1) and the average refraction velocity (V_2) for the high-velocity beds below lvl, are discussed; the latter velocity is treated with reference to the homogeneity of underlying layers.

(1) The transmission characteristics of the lvl favor lower reflection frequencies and thus tend to turn the layer into a part of the seismograph's receiver. The ensuing interference is the cause of a high percentage of poor reflection records. Shear waves are transmitted well, but not compressional waves.

(2) Variations of the lvl are common in mature topography; corrections for them are discussed. A calculation of lvl depth offers difficulties, but the easy determination of the time delay simplifies computation of an approximate value. In seismic practice, a universal 2,500'/sec. velocity is usually adopted regardless of local conditions. - V. S.

8379. Matthews, T. H. An Elementary Proof that the Path of a Seismic Wave Will be Circular if the Velocity Increases Linearly with Depth (abs.). Trans. Roy. Soc. Canada, Ottawa, 3rd ser., vol. 39, 1945, List and Minutes, p. 148.

A proof by elementary methods is given that the quickest path between two points A and B on the surface is an arc of a circle when the velocity increases linearly with depth. Also that the wave-front of a disturbance starting at any point P is a sphere of a non-intersecting coaxial system. - Author's abs.

8380. Narvarte, P. E. On Well-Velocity Data and Their Application to Reflection Shooting. Geophysics, Menasha, Wis., vol. 11, No. 1, 1946, pp. 66-81.

Current methods of computing seismic reflection data employing the integration of the actual velocity-depth (or velocity-time) relation in the velocity column are confronted with difficulties and limitations because they neglect the stratigraphic effect upon the velocity distribution.

A method is proposed by which the measured incremental time-depth relation, Z/ T, to each of a number of stratigraphic markers may be combined into one generalized depth or time function satisfying well-velocity data from a number of wells. The proposed method employs the integration of this slope relation and is used in conjunction with regional correction contour maps. Because this relation results from the combined load and stratigraphic effects together with the geological behavior of the section, this method offers distinct advantages both in accuracy and applicability. Advantages and limitations in the application of this method are discussed. - Author's abs.

8381. Radio Craft. Earthquake Recorder. New York, vol. 16, No. 5, 1945, p. 287.

Describes the seismograph designed and operated by F. Keller of New Kensington, Penna. A horizontal pendulum is used for the pick-up. Light reflected from a mirror on the boom falls on a photocell. The electrical output of the cell is amplified sufficiently to operate a galvanometer capable of writing on smoked paper. - F. J. H., Bibl. Seismol., No. 17, 1945, p. 291. (See also Geophys. Abs. 121, No. 7975. - V. S.).

8382. Robertson, Florence. On Long-Period Seismographic Disturbances. Trans., Am. Geophys. Union, Washington, D. C., vol. 27, No. 1, 1946, pp. 11-13.

A series of experiments was carried out at Saint Louis using the Macelwane-Sprengnether horizontal component electromagnetic seismometers working in synchronism with type H-S, L and N galvanometers having a period of 20 seconds; both the seismometer and the galvanometer were critically damped. With this equipment, some more or less regular long-period disturbances were recorded. These disturbances were finally eliminated by operating the seismographs in a seismic vault in which both the temperature and the humidity were controlled. Although no physical explanation for this can be given at the present time, it appears worth while to point out that these results are similar to those found by Milne in Tokyo, The United States Coast and Geodetic Survey in Honolulu, and by Shaw in England. - Author's abs.

8383. Rothé, J. P. Les séismes des Alpes Francaises en 1938 et la séismicité des Alpes Occidentales (The Seismic Activity of the French Alps in 1938 and the seismicity of the Western Alps). Ann. Inst. Phys. Globe 1938, Mende, France, n. ser., vol. 3, pt. 3, 1941, pp. 1-105.

The seismic activity of the High Alps (Hautes Alpes) during 1938-39 is described from a macroseismic and microseismic angle. The major shocks in other parts of the French Alps during 1938 are also related. Particular attention is devoted to the earthquake of July 18, 1938, discussed with respect to such problems as geological effects, structure of epicentral zone, calculation of epicenter, thickness of covering layer, and time of origin at the hypocenter, with a verification of Macelwane's table for distant stations. A background to this activity is provided by an historical account of seismicity in the entire western Alps before the 19th century and during 1800-1940. Sketch maps, profiles, a chronological list, and a bibliography are included. - V. S.

8384. Sheffet, David. Geophysical Prospecting Equipment. Electronics, New York, vol. 18, No. 12, 1945, pp. 116-123.

Four million dollars are spent annually in the United States on electronic equipment for geophysical exploration. The greater part of this amount is used for seismic apparatus employing different types of electronic circuits that include variable sensitivity amplifiers for recording galvanometers, time control for recorders, and time registration for indicating the time and depth of shot. These are described in application to such phases of seismic field work as gain control, avc problems, electronic variable resistors, use of filters, phase distortion limitation, seismic recording practice, communication circuits, and complete recording units. Diagrams of circuits and samples of seismograms illustrate the text. - V. S.

8385. Shook, E. M., Olson, R. W., and Kerr, R. B. Combination of Amplitude and Frequency Modulation for Communication in Seismograph Exploration for Petroleum Reservoirs. Proc. Inst. Radio Eng., New York, vol. 32, No. 10, 1944, pp. 583-590.

The reflection-seismograph method of exploring and contouring various subsurface geological beds suitable for petroleum deposits is reviewed briefly. Instrumentation techniques are passed over briefly, with the exception of equipment as described, which is devised to transmit and receive by frequency modulation certain electrical impulses generated coincident with the detonation of the dynamite charge and with the arrival of the seismic impulse at the earth's surface immediately above the explosive charge. Amplitude modulation of voice signals was devised for transmission and reception over the same radio channel. The combination of the two schemes of modulation provided suitable voice reception without interfering with the frequency-modulation system to record the time break and uphole geophone electrical impulses free of static and accurate to 1/1000 of a second. The apparatus provides also for transmission of these impulses and voice signals by wire transmission with the same magnitude, clarity, and precision by means of simple switching arrangements. The 10-watt input amplitude-modulation-frequency-modulation transmitter devised is ample for the purpose up to 1 mile, which is sufficient for reflection seismograph exploration. - Authors' abs.

8386. Smith, Hampton. Review of Petroleum Exploration Sciences. Petrol. World, Los Angeles, Calif., Annual Review, 13th ed., 1945, pp. 91-95.

Exploration techniques were improved in a number of ways during 1945. Particular attention is deserved by a new seismic method for water-covered areas which has been used off the coast of the Los Angeles basin by the United Geophysical Co. The seismic detectors are suspended a few feet below the surface of the water from cables operated by barges. When the lines occupy their positions, the terminal detectors must be shot in by instruments situated on the shore. It is found that vibrations carry through the water as readily as through the earth, and records have equal utility.

In the Los Angeles survey, the area explored extended up to 3 miles off shore, at a depth of not more than 60 feet of water. Dynamite was detonated at various levels between the bottom and the surface of the water, with charges not in excess of 40 pounds. Under optimal conditions, the cost proved to be only slightly greater than that of land surveys. Some other innovations in exploration are described. - V. S.

8387. Valenzuela, J. I. Earthquake-Resisting Structures. Engineer, London, No. 178, 1945, pp. 64-67.

Reference is made to disastrous earthquakes in Chile, Japan, and San Francisco, and the consequent urge to improve the resistant qualities of buildings. Research on model and earthquake records has resulted in a new theory, which takes into account the earth oscillations and also the mass and elasticity of buildings, thereby enabling the forces acting on the various members of a structure to be calculated. Earth tremors are propagated by longitudinal waves radiated from the hypocenter, followed by slower transverse waves; these are followed by the principal waves from the epicenter. The irregular motion of the epicenter causes great danger to buildings. Earth tremors may have periods from a few hundredths of a second up to 10 seconds, but the most destructive waves have a period of 1 to 2 seconds. In relation to the foregoing, the natural periods of different structures are examined, and a description is given of an elasticity meter designed and constructed in the University of Chile. - G. E. A., Phys. Abstr., vol. 48, No. 574, 1945.

8388. Widess, M. B. Effect of Surface Topography on Seismic Mapping. Geophysics, Menasha, Wis., vol. 11, No. 3, 1946, pp. 362-372.

The presence of rough surface topography in a prospect frequently constitutes a source of error in seismic mapping and poses the question of what computational methods can be applied by which seismic maps might be freed of the effect of surface relief. Various aspects of the problem are described. The use of a plane datum horizon is generally adequate as a solution of the problem. The datum horizon may be modified to account for the overburden effect, the approximate magnitude of which is considered. Further modification may be required by lateral variations in subweathering velocity. Statistical analysis for determining the degree of conformity between surface topography and mapped structure at depth is a useful tool in the study. - Author's abs.

Uemura, Kimio. Contribution to the Results of Geophysical Prospecting Recently Made in Japan (abs.). Intern. Geol. Cong., 17th Sess. U. S. S. R., Abstracts of Papers, Moscow, 1937, p. 186 (see Abs. 8393 in this issue).

4. ELECTRICAL METHODS

8389. Evjen, H. M. The Principle of Variation in Path, with an Application to Structural Mapping. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 453.

A general functional analysis of the low-frequency electric exploration problem is presented. The theory is applied to some field data where a fair degree of subsurface control exists.

8390. Guelke, R. A Geophysical Prospecting Instrument Using Alternating Currents of Audio-Frequency. Jour. Sci. Instr., No. 22, 1945, pp. 141-145.

In Hedstrom's modification of the Sundberg method of geophysical measurements, difficulties are encountered in balancing an a.c. bridge employed for detection when a petrol-driven generator is used for supplying the current in the earth wire, owing to frequency variations caused by changes in the generator speed.

A tuning fork controlled oscillator is described in which frequency stability permits the use of a resonance bridge circuit very sensitive to phase and frequency variation. The tuned circuits in the two halves of the bridge also eliminate the effects of disturbing fields. Phase balance is achieved by simultaneous increase of one tuning condenser and decrease of the other, and an intensity balance can be completed by means of a simple potential divider. Full circuit details are given of the oscillator and bridge circuit, with the detector amplifier. - A. W., Phys. Abstr., sec. B, vol. 48, No. 573, 1945.

8391. Guyod, Hubert. Electric Log Interpretation, Parts 1-4. Oil Weekly, Houston, Tex., vol. 120, Nos. 1-4, 1945, pp. 33-42, 38-41, 33-40, 36-46.

Part 1. The first step in the location of petroleum is the discovery of suitable reservoirs. At present, the potential graph of an electric log, notwithstanding its shortcomings, is probably the best tool available to the oil industry for locating porous media. The possibilities and limitations of the method are reviewed.

Part. 2. Frequently fractured or cavernous limes and dolomites cannot be picked from the potential graph of an electric log. These porous media are usually easier to distinguish from the denser zones by using a resistance curve. How this is done is explained.

Part. 3. Part of the difficulties experienced in the interpretation of electric logs made in fairly resistant formations is due to the failure to use true resistance data instead of the noncorrected values given by the log. When and how the necessary correction should be made is explained.

Part 4. The importance of true resistivity data is further clarified by an explanation of their use in the estimation of petroleum saturation in sand-type reservoirs. - Author's abstracts.

8392. Ku, K. H., Wang, T. C., and Chang, H. C. An Investigation of the Chaotung Lignite Field by the Wenner's Resistivity Method of Electrical Prospecting. Contr. Econ. Geol., Kueiyang, China, No. 1, 1944, pp. 111-116.

An electrical survey has been made of the Chaotung lignite deposit of north-eastern Yunan. This formation is a flat layer stretching a few meters below the Chaotung basin. It varies in thickness from a few centimeters to more than 15 meters and is completely overlaid by gravels, sand, and clay mostly low in electrical resistivity. The view had been held that the deposit extends over an area of 200 square kilometers.

The survey was made by means of Wenner's resistivity method, with the use of an electrical "megger", over 100 widely scattered profiles. Lignite behaved in most parts as a high-resistivity material. The curves plotted for the profiles were compared with corresponding geological sections and the data of sample tests. The results indicated that the deposit is continuous only on the western and southern rims of the basin, has a width of 2 to 3 kilometers, and even there thins out locally. A recent geological survey had lead to similar conclusions. - V. S.

8393. Uemura, Kinio. Contribution to the Results of Geophysical Prospecting Recently Made in Japan (abs.). Intern. Geol. Cong., 17th sess. U. S. S. R., Abstracts of Papers, Moscow, 1937, p. 186.

In 1922 the Geological Survey of Japan began a series of studies and applications of geophysical prospecting. The author directed the work.

1. Electrical surveys were made by means of resistivity, potential, potential-drop-ratio, and induction methods. They explored metallic deposits of cupriferous pyrite in crystalline schists, various types of veins in rocks, contact metamorphic copper deposits, black ore deposits, bituminous coal seams, oil-bearing strata, faults, buried granite hills, and underground waters. In the Yabase oil field, Akita District, the resistivity method detected rich oil-bearing layers located at depths less than 150 meters. In the Joban coal field, the fault plane between granite and the Tertiary rocks was traced and the hade calculated from the data.

2. A seismic refraction survey was conducted at the Kashiwazaki oil field to determine the configuration of the oil-bearing Tertiary formation. Radio seismographs with six receivers constructed in Japan served for registration. The results conformed closely to the logging data of bore holes. (An English abstract is given in Japanese Journ. Geol. Geogr., Tokyo, vol. 19, Nos. 1-4, 1944, Abstracts, p. 33). - V. S.

8394. West, T. S. A Resistolog Survey of the Loma Alto-Seven Sisters Area of McMullen and Duval Counties, Texas (abs.). Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 453.

Additional field results with the Resistolog procedure are shown. This method of direct current resistivity prospecting was described in the October 1944 issue of Geophysics (see Geophys. Abs. 119, No. 7712). Precise measurement of subsurface electrical properties is attained by eliminating from the data the influence of surface or near-surface variations in resistivity.

5. RADIOACTIVE METHODS

8395. Baranov, V. I., Kunasheva, K. G., and Tseitlin, S. G. The Use of Radiochemical Analysis for the Correlation of Geological Strata (in Russian). Bull. (Izvestiia) Acad. Sci. U.R.S.S., Moscow, Classe Sci. Chim., 1943, pp. 178-190.

The Ra and Th contents of the rocks in the Permian and Upper Carboniferous strata from Upper Uslon bore holes near Kazan are reported. The radioactivity decreases in the rocks in the order limestone, dolomite, anhydrite, gypsum. The average Ra content is 5.38×10^{-11} percent, equivalent to 1.61×10^{-4} percent U, and Th is 1.09×10^{-4} percent. The Th/U ratio of 0.68 is much lower than in most rocks. Only the carbonates of the Schwagerina horizon show a high Th content, and this fact may be useful in their identification. Bore hole H_2O from this region contains up to 5×10^{-11} percent Ra and 8×10^{-16} percent MsThI. The presence of Ca and especially of Ba in the H_2O favors the presence of Ra. The radioactive elements in the H_2O are probably dissolved from the minerals of the region. - Chem. Abs., vol. 38, No. 7, 1944, p. 1452.

8396. Beers, R. F. Radiometric Determination of Potassium in Rocks and Soils. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 455.

The radioactive isotope of potassium $_{19}K^{40}$ emits beta and gamma rays, which offer a convenient means of quantitatively determining the potassium content of rocks and soils. When the radiations from uranium and thorium minerals in the samples approach equality with the number from potassium, measurement of both beta and gamma rays are required for differentiation.

The paper describes a method of making both beta and gamma measurements with the same apparatus. Calibrations and corrections for absorption of radiation by the sample are given. The influence of potassium radiations on gamma-ray well logs is discussed.

8397. Bullard, E. C. Geological Time. Mem. Proc. Manchester Lit. Phil. Soc., Manchester, vol. 86, No. 4, 1943-45, pp. 55-82.

The methods for measuring geological age are discussed in the light of the recent advances by N. B. Keevil and A. O. Nier demonstrating the superiority of the lead time scale over the helium scale.

It is found that the methods based upon the known rates of radioactive disintegration of uranium and thorium have requirements difficult to satisfy in practice. 1. The quantities of uranium, thorium, and of their products, helium and lead, identified in a rock must be susceptible of precise measurement. 2. These quantities should change under the influence of radioactive decay alone and not of any other processes. 3. At the beginning, the rock should be free from radioactive elements, or else the lead or the helium produced by radioactive decay should be distinguishable from that present initially.

Investigations have shown that helium is likely to be free of radioactivity from the start. Lead, however, does not satisfy either one of the last two alternatives, and the lead method cannot be applied for measuring the age of igneous and sedimentary rocks. - V. S.

8398. Fearon, R. E. How the Properties of Nuclear Radiation Influence Radioactivity Logs. (Abs.) Geophysics, Menasha, Wis., vol. 10, No. 3, 1945, p. 452.

The effect of penetrating power of nuclear radiation, the amount of corpuscular energy, and the ability of various nuclear radiations to excite secondary processes is discussed with respect to gamma-ray well logging. The importance of the transformations to which neutrons are susceptible is discussed with respect to their influence on neutron logs. Experimental demonstrations of some of the common properties of nuclear rays were given.

8399. Jackson, W. J., and Campbell, J. L. P. Some Practical Aspects of Radioactivity Well Logging. Am. Inst. Min. Metal. Eng., New York, Tech. Pub. 1923, 1945, 27 pp.

Automatic recording of the radioactivity of the earth's formations provides a log of relative intensities that, if properly interpreted, can be applied to oil-field engineering. Production, engineering, and geological departments regard the radioactivity log as a step forward in obtaining more conclusive information for successful well completions. Explanations of the technique, together with some of the problems to which radioactivity logging have been applied, are presented in this paper. - Author's abs.

8400. Roggen, F., and Scherrer, P. Über einen Nachwirkungseffekt an Zählrohren bei Bestrahlung mit Röntgenstrahlen (Regarding an After-effet Produced in Counters by X-Ray Illumination). Helv. phys. Acta, Basel, vol. 15, 1942, pp. 497-500.

Radioactivity counters were subjected to illumination by X-rays of 160 to 180 kv. for about 20 minutes. A hightened zero effect was observed thereafter. Its decline with time could be plotted in two exponential curves for a duration of 7 and 18 minutes, respectively. In order to trace this effect to any particular part of the counter, each part of a dismantled counter was subjected separately to illumination. Then the counter was reassembled and tested. The results showed that the thermal effect is limited to the cathode and disappears when this is made of zinc or plated with gold. When aluminum is used, the decline follows the course computed by Tanaka for an ideal isolating layer. The same is true, to a lesser extent, of other materials. It is concluded that the observed phenomenon should be attributed to the action of a thin isolating layer. - V. S.

8401. Starik, I. E. Radiological Investigation of Mineral Waters in the Caucasus Region (in Russian). Bull. Acad. Sci. U.R.S.S. (Izvestia), Moscow, Sér. Chim. Sci., 1943, pp. 435-442.

A general discussion of the occurrence and origin of radioactive waters. Few experimental observations are given. It is considered that the leachability of rock structures is an important factor, hitherto underestimated, in determining the radioactivity of waters in contact with them. - V. B., Brit. Abs., Sept. 1945, p. 254.

8402. Wickman, F. E. A Graph for the Calculation of the Age of Minerals According to the Lead Method. Årsbok Sveriges Geol. Undersok, Stockholm, vol. 37, No. 7, 1944, pp. 1-6.

For values of Pb/(U+Th) and U/(U+Th), separate graphs are given showing ages 10 to 100 and 100 to 3200 million years. - L. J. S., Mineral. Mag., London, vol. 27, No. 187. 1944, p. 69.

6. GEOTHERMAL METHODS

8403. Bullard, E. C. Thermal History of the Earth. Nature, London, vol. 156, 1945, p. 35.

The heat of the earth is discussed with regard to its variations and sources. (1) Geothermal gradients show regional and local variations. The regional variations depend in part upon the conductivity of rocks which characterizes heat flow. Unfortunately, conductivity is difficult to measure, has seldom been determined in thermal surveys, and remains little known. Studies made recently in Great Britain, South Africa, and Persia show that the product of the gradient by the conductivity is nearly constant. The local variations of gradients are due partly to geological structure; for example, salt domes affect heat distribution because of their high conductivity. (2) The earth derives its heat largely from processes of radioactive decay. Investigations on the amount of radioactive elements in rocks indicate that granite is rich in them and may explain gravity anomalies. Since there is apparently no granite under ocean basins, the radioactive heat under these basins should be less than under continents, and corespondingly the density. The resulting density-differences could produce convection currents and variations in gravity that would cause anomalies. - V. S.

De Lury, J. S. Outline of a Hypothesis to Explain Crustal Movements. Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 39, 1945, pp. 1-11 (See abs. 8330 in this issue).

8404. Heald, K. C. Introduction to the Summary of Research-Results Prior to 1932. Am. Petrol. Inst., New York, Annual Report of Progress - Fundamental Research on Occurrence and Recovery of Petroleum, 1943, (1944), pp. 173-178.

In outlining the research made by the American Petroleum Institute during 1926-31 on the occurrence and recovery of petroleum, the author reviews Project 25, Determination of Geothermal Gradients in Oil Fields on Anticlinal Structures. This investigation was undertaken to test observations that the temperature at a depth of a thousand or more feet on the crest of an anticlinal structure is higher than the temperature at the same depth on the flank of the structure. If this relationship were general, then comparisons between the average temperature for a region and the temperature in a wildcat well would indicate the well's position with respect to structure.

The evidence obtained showed that, although the indicated relationship was fairly common, it did not invariably occur. Moreover, the difficulties encountered in making thermal measurements in wildcats rendered prospecting impractical. It was also found that surface temperatures above oil accumulations were not higher than those in the surrounding territory. On the other hand, measurements made on salt domes were abnormally high; they could not compete, however, with other geophysical methods for detecting salt domes. (For contrary views, see publications of R. W. French, S. S. Kovner, M. C. Terry, J. H. Burney, and C. E. Van Orstrand). - V. S.

8405. Kovner, S. S., and Shneerson, B. L. Thermal Method of Prospecting Versus Gravitational and Electric Methods. Compt. rend. (Doklady) Acad. Sci. U.R.S.S., Moscow, vol. 47, No. 1, 1945, pp. 28-30.

The Termen-Elga region, U.S.S.R., is known to contain an Artinskian limestone dome. Such a structure usually holds rock salt on one limb and anhydrites on the other. The dome had not been detected by the gravitational and electric methods applied, for reasons indicated. The authors then made a survey by means of the geothermal method to test its serviceability in prospecting for minerals. The work was carried out in the light of previous data on the thermal conditions of rocks (Geophys. Abs. 114, No. 7066; 115, No. 7188; 123, No. 8259). These rendered it possible to plot the thermal fields of two explored cross sections, one through the dome and another outside of it; calculations were made by a special time-saving method

(Geophys. Abs. 115, No. 7189). The thermal curves obtained revealed an anomaly over the Artinskian dome which attained 0.63° C. at a depth of 100 meters and 1.28° C. at 200 meters. The conclusion is reached that thermal measurements can detect the existence and indicate the position of an Artinskian dome. - V. S.

8406. Mining Journal, London. Temperatures in Rand Mines. Vol. 224, No. 5721, 1945, p. 229.

Flugge-de Smith and Oscar Weiss presented papers on thermal measurements in Rand Mines at a recent meeting of the Chemical, Metallurgical, and Mining Society of South Africa at Johannesburg. 1. Oscar Weiss employed electrical resistance thermometers. About 250 readings were made in 17 specially drilled underground holes, and inordinate types of anomalies were encountered. In his account, the speaker stressed the need of much caution in comparisons of different mines: (a) Differences may exist in actual temperatures or in temperature gradients; (b) the dip of local beds and the time used for cooling the works before measurements should be considered; and (c) Ventersdorp lava and a Karroo cover increase temperatures appreciably. 2. Flugge-de Smith used clinical maximum thermometers. Numerous difficulties were encountered. The temperature at the depth of 9,900 feet was predicted to be around 115.5° F. - V. S.

7. GEOCHEMICAL METHODS

8407. De Ment, Jack. Fluorochemistry. Chemical Publishing Co., Inc., Brooklyn, N. Y., 1945, 752 pp. Price, $14.50.

This book embraces the theory and various applications of fluorescence, luminescence, and other radiation. The work of numerous investigators is outlined in its bearings on the basic concepts of fluorochemistry, homogeneous and heterogeneous luminescent systems, ultraluminescence, and infraluminescence. The properties of luminescent substances are tabulated; one table lists 2,836 fluorescent organic compounds, with notations about the excitation conditions, nature of the luminescence produced, solvent, and literature. The text is supplied with a nomenclature and bibliography. (Reviews appeared in Am. Jour. Sci., vol. 244, No. 7, 1946, pp. 531-532, and Mines Mag., vol. 35, No. 3, 1945, p. 133). - V. S.

8408. Horvitz, Leo. Recent Developments in Geochemical Prospecting for Petroleum. Geophysics, Menasha, Wis., vol. 10, No. 4, 1945, pp. 487-493.

A number of surveys completed during the past 2 years indicate that the geochemical-prospecting technique can be applied successfully only when an area is explored that is sufficiently large to enable ready distinction of the anomaly from the background. The geochemical anomalies found by reconnaissance sampling have been proved to be associated with tructure by reflection seismograph. These confirmations indicate that he two methods can be used to supplement one another - one to detect the ossible presence of a petroleum accumulation and the other to determine he probable depth of the accumulation.

The results of a reconnaissance geochemical survey over the Heidelerg area of Jasper County, Mississippi, are presented. - Author's abs.

409. Mekhtiev, Sh. F. Petroleum Prospecting by Means of Gas Sampling (in Russian). Azerbaidzhanskoe Neftianoe Khoziaistvo, Baku, No. 1, 1941, pp. 15-17.

The author discusses the method of gas sampling proposed by Sokolov or petroleum prospecting. The chief disadvantage of the method is that he gas diffusing from the petroleum field does not rise in a strictly ertical direction. The presence of hydrocarbons in the soil atmosphere esulting from the decomposition of organic matter must also be considered n taking gas samples. Although gas sampling is a valuable method of etroleum prospecting, its practical application requires further studies. - hem. Abs., vol. 38, No. 4, 1944, p. 853.

410. Mining and Industrial Magazine of Southern Africa. Seeking Oil by Means of Bacteria. Johannesburg, vol. 33, No. 9, 1945, p. 577. Also: Rhodesian Mining Jour., Johannesburg, vol. 18, No. 225, 1946, p. 45.

The question whether there is oil in South Africa remains unsettled. Exploratory drilling in the low lands yielded no discoveries. To clarify uncertainty, the author recommends broad reconnaissance by means of the new bacterial method developed in the United States during the war. The underlying theory holds that petroleum is the product of the conversion of certain raw materials by bacteria in the earth removing nitrogen, phosphorus, and sulfur from organic matter and leaving only petroleum compounds. This process eventually forms oil accumulations, which begin to emanate gases escaping in minute quantities from any depth to the surface. The saturation of the soil is too small to be detected by any known chemical analysis. However, late research has revealed that desulfo-vibro bacteria are attracted by these emanations and congregate in the localities of high saturation. Accordingly, exploration can be guided by the density of the distribution of this variety of bacteria in the soil. Drilling tests based upon this principle have been successful. - V. S.

3411. Thyssen, Stephan, von. Allgemeines über Bodenuntersuchungen auf Kohlenwasserstoffe und Versuche in der Nähe eines norddeutschen Ölfeldes (General Considerations Concerning Explorations of the Ground for Hydro-carbons and Trials in the Vicinity of an Oilfield in Northern Germany). Öl und Kohle, Berlin, vol. 38, 1942, pp. 555-557.

The basic facts of geochemical prospecting are indicated and the field tests made in Germany reported. 1. Solid hydrocarbons are less suited for use in geochemical exploration than liquid and gaseous hydrocarbons; among the latter, the higher fractions are credited with greater diagnostic significance. The ground's specific absorption capacity probably is also a factor. Little is known as yet about the concentrations, migrations, and diffusions of hydrocarbons in the ground. Generally, the fundamental theoretical conceptions are still lacking. 2. A few trials of hydrocarbon prospecting for oil have been made in Mölme. They consisted in taking samples of ground along traverses traced over known salt domes and oil deposits. These samples were analyzed by the Geological Scientific Service in the United States. The results obtained are plotted and discussed. Other tests in the Mölme region were undertaken by the Seismos Co. - V. S.

8412. Tripp, R. M. Micro-Migration of Gaseous Hydrocarbons as Related to Geochemical Prospecting. Min. Mag., Denver, Colo., vol. 35, No. 10, 1945, pp. 513-515.

The physical and chemical properties of the strata which surround petroleum accumulations might have a diagnositc value in exploration. In order to clarify such a possibility, the author considers, in mathematical terms, the nature of porous media, mechanics of fluid movement, thermodynamics of the vertical migration of gases, and influences in the vadose zone. The conclusion is reached that the different analyses of soil hydrocarbons as to rate of efflux or amount adsorbed offer little promise in exploration because of the many indeterminable factors involved. Certain secondary influences in the investigated area may prove to be better guides in exploration. - V. S.

8. GENERAL AND UNCLASSIFIED GEOPHYSICAL SUBJECTS

8413. Blau, L. W. Geofísica, Geoquímica y el Practico de Petróleo (Geophysics, Geochemistry, and the Practical Man of Petroleum). Industria Min., Buenos Aires, vol. 5, No. 52, 1945, p. 31.

The province and principles of geophysics, geochemistry, and the related fields of physics, chemistry, geology, mining, petroleum engineering, electricity, etc., are discussed briefly with a view to dispelling the prejudices of "practical" oil men who mistrust the theoretical character of scientific reasoning. A few facts on the development of geophysics are given. - V. S.

8414. Boyd, L. H. Army Vehicles for Geophysical Crews. Min. Mag., Denver, Colo., vol. 35, No. 10, 1945, pp. 538, 590.

During 1945 many geophysical companies throughout the United States purchased Army vehicles discarded after the war. These cars have proved themselves to be particularly suited to rough country inaccessible to ordinary cars. They have been used by gravity crews in the Everglades of

Florida as plane-table or instrument carriers, some of the latter amphibious. The vehicles offered for sale can also be converted into reconaissance cars, seismograph recording trucks, and to other purposes. - V. S.

8415. Fedynsky, V. V. Geophysical Prospecting for Oil in the U.S.S.R. at the Time of the Patriotic War, 1941-43 (in Russian). Bull., Acad. Sci. U.R.S.S. (Izvestiia), Moscow, Sér. Géogr. Géophys., vol. 8, No. 5, 1944, pp. 229-243.

In the U.S.S.R., geophysical exploration has been conducted by Government agencies. Before World War II the Commissariat of the oil industry established for such purpose a geophysical trust and the State oil industry had a central Office of Geophysical Prospecting, etc. The war augmented exploration one and one-half times during 1941-43. Various methods served in the work.

1. Seismic surveys, 44 percent of total, covered large areas about the Caspian Sea. Much success was gained in the salt-dome region of the Emba basin on the northeastern Caspian shore; reflection proved adequate along the coast near Baku; special methods of detonation on the surface had to be used in the Turkmenia desert.

2. Electrical surveys, 28 percent, covered considerable areas between the middle Volga and the Urals. They often combined D.C. current and gravity methods; distances up to 20 kilometers interspaced the electrodes. The geological interpretation of electrical results improved considerably.

3. The gravity measurements, 24 percent, had to be made mostly with torsion balances because of a scarcity of gravimeters. In Bashkiria, new oil-bearing structures were discovered.

4. Magnetic surveys served for the general delineation of structures in some regions. In all, geophysical exploration is considered to have made a valuable contribution to national defense. - V. S.

8416. Kintz, G. M. The Need of Standardized Instructions for Handling Explosives by Geophysical Parties. Min. Mag., Denver, Colo., vol. 35, No. 12, 1945, pp. 677-686.

Field crews suffer casualties during geophysical exploration because of insufficient knowledge on the use of explosives. The geophysical companies that made surveys in the Southern Central States paid over $47,000 in compensation during 1943-45. To remedy the situation, the author advises the adoption of standard instructions for handling and using explosives in field work. As a first step toward developing these, he advocates studying the facts and presents 15 analyses of accident reports filed with the U. S. Bureau of Mines. - V. S.

8417. Lahee, F. H. Review of Exploratory Drilling Statistics, 1938-44. Bull., Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 11, 1945, pp. 1581-1592.

This review of exploratory drilling in the United States includes statistics on the prospecting methods used for locating boreholes. The material covers the period 1938-1944 and the area of 17 States. The general trend of the relative success of various methods can be characterized by the following figures: (1) Data for 1938: Geology, 192 holes productive, 1,039 dry; geophysics, 78p, 251d; geology and geophysics, 31p, 67d; sundry nontechnical, 44p, 535d; unknown, 24p, 372d; totals: 369p, 2,264d; grand total, 2,633 holes. (2) Data for 1944 and the same differentiation: 568p, 2014d; 145p, 643d; 102p, 263d; 58p, 672d; 5p, 80d; totals: 878p, 3,672d; grand total: 4,550 holes. - V. S.

8418. Mining Journal, Phoenix, Ariz. Bureau Releases Program for Mining Reconversion. Vol. 29, No. 16, 1946, pp. 33-34.

The policy of the U. S. Bureau of Mines for the post-war reconversion period is to assist the country's mining industry by exploring natural resources. This work would include experimental research on exploratory methods and geophysical surveys of promising areas that do not lend themself to surface investigation. The deposits should be selected on the basis of their contribution to national security and opportunities for technical solutions advancing the utilization of mineral resources. - V. S.

8419. National Oil Scouts and Landmen's Association. Oil and Gas Field Development in United States, 1943. Austin, Tex., Yearbook 1944, vol. 14, 875 pp.

Assorted reports by district association editorial staffs and members outline oil and gas developments during 1943. They consist of reviews and statistics covering geological and geophysical prospecting, wildcat exploration, proven field extensions, leasing, production, and refining carried out in 27 States and the United States as a whole. The success of geophysical and other methods in locating productive holes is indicated in the material for some States and also in an appendix by F. H. Lahee on exploratory drilling in 27 States. - V. S.

8420. National Research Council, U. S. A. American Geophysical Union. Rep. Nat. Acad. Sci., 1943-44, Government Printing Office, Washington, D. C., Senate Document 88, 1945, pp. 25-26.

The 25th annual meeting of the American Geophysical Union was held in Washington, D. C., on June 1-3, 1944. The resolutions adopted dealt with the postwar geophysical, oceanographic, and microseismic work, establishment of a geophysical station in Alaska, seismological cooperation among the nations of the Western Hemisphere, and accurate time service. Consideration was also given to expanding scientific projects and expeditions made jointly by governmental agencies and private institutions. The papers and progress reports included 118 items. - V. S.

5421. National Research Council of Japan. Transactions and Abstracts, 1944. Japanese Jour. Geol. Geogr., Tokyo, vol. 19, Nos. 1-4, 1944, Section of Abstracts, pp. 31, 32, 34, 35, 38.

In the section of abstracts, brief bibliographical entries are made of the following Japanese geophysical publications:

Inoue, W. Radioactive prospecting at Hsing-ching Hot Spring (in Japanese). Bull., Geol. Inst. Hsinching, Manchukuo, No. 98, 1940, pp. 23-32.

Iwasita, M. Report on electrical prospecting at Hsing-ching Hot Spring; Chin-chour Province (in Japanese). Bull., Geol. Inst. Hsinching, Manchukuo, No. 98, 1940, pp. 33-42.

Matuzawa, T. Seismic investigations of the earthquake of March 2, 1933. Part 4: The spatial differentiation of waves propagated from the focus (in German). Bull., E. R. Inst. Tokyo Imp. Univ., vol. 19, 1941, pp. 104-114.

Nagata, T. A note on regional anomaly and secular variation in geomagnetism (in English). Bull., E. R. Inst. Tokyo Imp. Univ., vol. 20, 1942, pp. 107-119.

Takahasi, R., and Hirano, K. Changes in the vertical intensity of geomagnetism that accompanied the eruption of Miyakezima in 1940 (in English). Bull., E. R. Inst. Tokyo Imp. Univ., vol. 19, 1941, pp. 82-103.

Tsuboi, C. Relations between gravity anomalies and the corresponding subterranean mass distribution. Bull., E. R. Inst. Tokyo Imp. Univ., Part I, with Yamaguti, S. (in English), vol. 19, 1941, pp. 26-38; Part 7 (in Japanese, English summary), vol. 20, 1942, pp. 30-38.

Some publications are also listed on the subject of volcanoes and associated phenomena. - V. S.

5422. Nature, London. Geological Service of the U. S. S. R. Vol. 154, No. 3913, 1944, p. 556.

In 1944, the Geological Committee of the Council of People's Commissars, U. S. S. R., concentrated on the search for new mineral deposits. Particular attention was devoted to molybdenum, tungsten, tin, mercury, and mica. A considerable number of geological field parties has worked in the field. They used modern techniques, such as the magnetic, gravitational, seismic, and other geophysical methods. Employment of the latter methods led to a number of discoveries in past years; for example, an aeromagnetic survey in western Siberia detected new iron deposits. With a view to aiding exploration, a special office, "Geological Records of the U. S. S. R," collect materials on all the geological work done on Soviet territory. In 1944, this office began compiling an encyclopedia of mineral deposits in the U. S. S. R. - V. S.

5423. U. S. Department of the Interior. Annual Report of the Secretary of the Interior for the Fiscal Year Ended June 30, 1945. Washington, D. C., Govern. Print. Office, 1945, 323 pp.

In his letter of transmittal, the Secretary attaches particular importance to the exploration of oil and metals in the continental shelf in view of the staggering depletion of national assets caused by the war.

The continental shelf comprises the ocean floor around the United States and its territories covered by no more than 600 feet of water. The whole area approximates 750,000 square miles. Along the Alaska coastline it extends several hundred miles under the Bering Sea; on the eastern coast it has a width of 20 to 250 miles, and along the Pacific coast it measures from 1 to 50 miles. The part reaching into the Gulf of Mexico alone could yield some 22 billion barrels of oil. The shelf is also estimated to contain rutile, sulfur, ilmenite, chromite, monazite, and other heavy minerals.

The oil reserves of the shelf may be brought under exploitation in a relatively short time because the techniques for recovering them from deep waters are considerably advanced. Oil companies have already recovered oil from an oil field 1 mile off the Louisiana shore and from another field 2 miles off the coast of Texas; one company explored the floor of the Gulf of Mexico up to 26 miles offshore.

The Department of the Interior has been assigned by the Government to explore the shelf. It plans a coordinated geophysical, geological, and engineering program. The work will be done partly aboard vessels and partly from submarines, diving bells, and airplanes. Instruments are being perfected. The cost of the survey may run to several million dollars. V. S.

8424. Wenler, A. P. A Geophysical History of the Lovell Lake Oil Field, Jefferson County, Texas. Geophysics, Menasha, Wis., vol. 11, No. 3, 1946, pp. 302-311.

Before the advent of geophysics the proximity of Spindle Top to the Lovell Lake area, peculiar topography, and rumored gas seeps prompted the drilling of a number of wells. In 1929 a torsion-balance minimum roughly delineated the present area of the field. Later this minimum was checked by the gravity meter. In 1933 and again in 1935 reflection-seismograph surveys pointed to this locality. Shortly after the discovery well was brought in, a final reflection-seismograph survey defined the Lovell Lake structure rather accurately. - Author's abs.

9. RELATED NONGEOPHYSICAL SUBJECTS

8425. Barb, C. F. Selected Well Logs of Colorado. Quart. Colorado Sch. Min., Golden, Colo., vol. 41, No. 1, 1946, 435 pp.

A total of 2,733 wells have been drilled throughout Colorado's history and up to June 30, 1945, in the search for oil and gas. The author has collected the log records of those wells that might be considered wildcats, regardless of location or depth; some of the early wells had not been logged. The tabulations presented give location, time, elevation, and depths of the formations; additional details amplify the data whenever possible. Many locations are plotted on a map complete to the end of 1944. The log records are accompanied by the geological correlation chart by C. E. Shoenfeld, a new field correlation chart and index map, both by J. R. Fanshawe, II, and several generalized cross sections. - V. S.

26. Brod, I. O. Geological Terminology in Classification of Oil and Gas Accumulations. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 12, 1945, pp. 1738-1755.

A classification of oil and gas accumulations furthers both the eory and the applications of prospecting methods by organizing the ncepts involved. Yet there is no standard classification, and not even y consistent use of terminology in practice and publications. To remedy is situation, the author presents his definitions and terms for discussion. e material covers oil-bearing rocks, source rocks, and accumulations of l and gas. It is illustrated with drawings and accompanied by a bliography. - V. S.

27. Cooke, N. M., and Markus, John. Electronics Dictionary. McGraw-Hill Book Co., New York, 1st ed., 1945, 433 pp. Price, $5.

This is an illustrated glossary of over 6,000 electronic terms in glish. Electronics is defined as concerned with the conduction of ectricity through gases or in a vacuum. The practical applications vered include radio, television, radar, facsimile, sound recording, etc. e definitions are as comprehensive and lodged in a language as nearly pular as the subject matter allows. Because of the highly technical ture of most applications and their rapid expansion, the glossary contains ny terms not given in the newest dictionaries. - V. S.

428. Eastman Kodak Co. Kodak Materials for Aerial Photography. Rochester, N. Y., 24 pp.

This booklet presents data on Kodak aero films Super-XX, Tri-X, and nfrared, with a brief summary of the properties of these films and a etailed specification sheet for each film. Kodacolor films are described. ome phases of the processing of films, the sensitized materials serving or laboratory work in aerial mapping, and the conditions of film storage, articularly important with high-speed aero films, are discussed. - V. S.

429. Fairbridge, R. W. Submarine Slumping and Location of Oil Bodies. Bull., Amer. Assoc. Petrol. Geol., vol. 30, No. 1, 1946, pp. 84-92.

The lessons of submarine slumping do not appear to have been utilized uch in the past, to the advantage to which they might, in assisting both ield and laboratory geologists in the survey, measurement, and appraisal f possible oil structures. A study of the paleogeographical implications f slumping leads to the conclusion that it may actually be an associated actor in the formation of oil. Typical examples of oil mother rocks re found in the Tertiary of the Carpathians and Caucasus, and a probable xample of oil in the process of formation is to be seen in the Black Sea oday; both are scenes of an enormous amount of submarine slumping both n the past and in the present. - Author's abs.

8430. Griffiths, J. C. Clay Research and Oil Development Problems. Jour. Inst. Petrol., London, vol. 32, No. 265, 1946, pp. 18.

There are two fundamental methods of approach to the problem of maintaining or augmenting oil reserves: The first demands geological exploration to discover new oil fields, whereas the second is based upon increasing the recovery efficiency in fields already under production. In either case, the increasing difficulties of locating new oil fields or of producing more oil from those already found demand a more detailed knowledge of the reservoir rocks and their development. Within this field of research the petrography of sedimentary rocks reigns supreme, and only by diligent pursuit of this subject can any spectacular advances be envisaged. It is the purpose of this paper to outline the significance of the clay materials in the problem of oil exploitation and production. - Author's abs.

8431. Guyod, Hubert. Caliper Well Logging: Part 4, Caving Pattern in Abnormal Shales. Oil Weekly, Houston, Tex., vol. 119, No. 3, 1945, pp. 52-57.

In many cases caliper logs are of value for helping locate petroleum reservoirs. A few practical remarks regarding this unusual application of caliper data are offered in this article. It is recognized that the method is quite imperfect at present. Undoubtedly, there will be progress in the not too distant future. - Author's abs.

8432. Jolliffe, A. W. Aeroprospecting in the Yellowknife Area. Canadian Min. Met. Bull., Montreal, No. 401, 1945, pp. 588-609.

Aeroprospecting is viewed by the author as an aid to ground exploration. To illustrate such application, he describes the geological mapping of the Yellowknife area, Northwestern Territories. At first, unaided visual observation from the air provided general orientation for the original mapping. These data were further amplified in 1941-43 by air photographs, oblique and vertical. The techniques are discussed with regard to diagnositc advantages and interpretation. - V. S.

8433. Melton, F. A. Preliminary Observations on Geological Use of Aerial Photographs. Bull., Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 29, No. 12, 1945, pp. 1756-1765.

The author discusses the applications of aerial photographs to different types of geological relief. In regions of low relief, a good photo-index sheet is to be preferred to photo-mosaics, cost of which is out of proportion to their usefulness. In regions of high relief, however, the mosaic is now the only means for obtaining a continuous picture map and has much value. A geological diagnosis of terrain in either type of relief requires a study of relationships best realized with contact prints. In all, the expenses of exploratory surveys on photography prove negligible in comparison with returns. - V. S.

434. Moon, L. B. Trends in Exploration of Mineral Deposits. Bureau of Mines Inf. Circ. 7312, Washington, D. C., 1945, 6 pp.

During the last 5 years, the U. S. Bureau of Mines has employed most f the engineering methods available for exploring mineral deposits after rospecting had detected them. The methods reported include the use of icket drill, truck-mounted seismograph drill, oil-well rotary rig, and neumatic wagon drill. The author adds: "Geophysics probably will be sed as another tool in the exploration OF deposits in addition to its resent role in the exploration FOR deposits. Drill holes and other penings for extracting samples will still continue to be needed, but the argets may be more precisely determined in advance." - V. S.

435. Nelson, A. Disrupted Strata. Min. Quarry Eng., Maidenhead, Berks., England, vol. 10, No. 4, 1945, pp. 95-97.

The exploration of disrupted mineral veins and ore bodies offers onsiderable difficulty because of the complicated and unpredictable haracter of fractures. In surveys, costly errors are being made that ould have been avoided with a better understanding of disrupted strata. he author seeks to assist the men planning exploration by listing the ommon misconceptions and explaining the nature of faulting processes. onsideration is given to normal fractures and fault striae, overthrow ractures, perplexing disruptions, and the determination of throw. The ext is illustrated by drawings. (A review appeared in Min. Ind. Mag., outh Africa, vol. 33, No. 10, 1945, pp. 615-619). - V. S.

436. Nikolaev, N. Devonian Oil found in the Urals. Petroleum Times, London, vol. 49, No. 1,258, 1945, p. 833.

Until recently, a few oil fields in the world produced from Devonian trata. In the Soviet Union the first Devonian oil was found in 1944 in he Zhiguli hills on the Volga. This discovery stimulated drilling in rasnokamsk, one of the richest sectors of the "Second Baku" region, situated etween Volga and the Urals. As a result, a gusher was struck recently at depth of nearly 2,000 meters. Geologists place a high value on the evonian oil-bearing strata in this region. - V. S.

3437. Porter, W. W., II, and Gregersen, A. A. Significant California Petroleum Developments in 1944. Petrol. World, Los Angeles, Calif., Annual Review, 1945, pp. 81-88.

A statistical study is made of petroleum discoveries in California uring 1944. The number of oil fields detected reached a high mark, but heir average size declined to a record low. The latter is the more ignificant, as an all-time peak of 353 wells were drilled. The yield er field amounted only to some 7 million barrels; low yield figures have een repeated during the past 5 years. As regards geophysical methods, the marked decrease in the success of wildcats drilled on seismograph plays may mean that this method has passed here its optimal use. A differentiation of drilling successes by the prospecting methods employed shows that exploratory wells other than wildcats are becoming the most economical means of discovering new reserves in California. - V. S.

8438. Richards, H. G. The Subsurface Stratigraphy of the Atlantic Coastal Plain. Trans. New York Acad. Sci., Lancaster, Pa., ser. 2, vol. 8, No. 1, 1945, pp. 1-4.

A number of new wells were drilled along the Atlantic coastal plain during the war. The author has studied samples from many of them and correlated the subsurface formations to determine local stratigraphy. The region investigated extended from New Jersey through Georgia; samples from about 200 wells were analyzed. The principal wells are listed and the findings summarized. They may interest geophysicists, particularly in view of the stratigraphic continuity between coastal plains and the continental shelf. None of the oil wells drilled up to the present along the coast north of Florida proved productive. The conclusion is reached that the evidence available is not encouraging. Nevertheless, the east coast can not yet be considered as entirely devoid of oil deposits. - V. S.

8439. Umbgrove, J. H. F. Origin of Continental Shelves. Bull., Amer. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 2, 1946, pp. 249-253.

In order to explain the common occurrence of a shelf edge at the isobath of 200 meters, a widespread subsidence of the shelf area in the order of 100 meters has to be assumed, apart from the influence of eustatic changes of sea level. Spasmodically, a warping or tilting movement has taken place along the continental border, causing submergence of what formerly was the margin of the continent and simultaneous bowing up of a marginal tract parallel with the newly formed coast line.

The most recent movements are revealed by the attitude of the marine terraces occurring along oceanic coasts in far-distant regions. It is argued that the periodical action of convection currents displaying themselves below the continental margin as a result of the existing distribution of sialic and simatic rocks in the border zone of continental and oceanic areas accounts for the periodical movements along the marginal flexure of the continents. So, the phenomena of the continental margin are correlated with other periodic events occurring in the earth's crust and its substratum.

Finally, a section is devoted to the submarine canyonlike trenches that are incised in the shelf body. These features are classified in three groups. Theories involving a subaerial origin of the notched shelf edge are incompatible with data presently known about the geological history of the continental margin. - Author's abs.

10. PATENTS

he figure in parentheses refers to the class in which the entry stands; e list in the table of contents).

440. (1) Force-Measuring Instrument. L. J. B. LaCoste and A. Romberg, Austin, Tex. U. S. 2,377,889, issued June 12, 1945.

In a gravity-measuring instrument the combination comprising a ass, a plurality of elastic members supporting said mass, a support, one f said members being a zero-length spring, the point of attachment of aid spring to the support being substantially in a vertical plane passing hrough the points of attachment of the other elastic members, means for oving the upper point of attachment of the zero-length spring, a determin-ble amount to bring the mass to a predetermined position, said last-entioned means comprising an anchor block, to which the upper end of said pring is attached, said anchor block being attached to the support by eaf springs, a lever, and spaced leaf springs attached thereto and to aid support and block respectively, whereby the effective point of support s movable a predetermined amount by said lever as a measure of variations n the force of gravity acting upon the mass - Claims allowed, 10.

441. (1) Gravity Meter. R. C. Sweet, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. 2,383,997 issued September 4, 1945.

A gravity meter comprising a support, gravity-responsive means, n elastic support member for supporting said gravity-responsive means, a resilient means connecting said gravity-responsive means to said elastic upport member, a micro-adjustment means mounted on said support, a econd resilient means interconnecting said elastic support means and aid micro-adjustment means, whereby determinable micro-adjustments in the osition of said gravity-responsive means are obtained, and means for etermining the position of said gravity-responsive means. - Claims llowed, 9.

3442. (1) Apparatus for Making Gravity Measurements. M. E. Moore, Prospect Park, Pa., assignor to Sun Oil Co., Philadelphia, Pa., a corporation of New Jersey. U. S. 2,389,866, issued November 27, 1945.

An instrument for measuring small variations in gravitational ttraction, comprising a member subjected to a torque, owing to a force xerted by gravity, and means for supporting said member for oscillatory ovement about an axis spaced from the center of gravity of said member, ncluding devices for preventing horizontal movements of said member nd for maintaining said member in equilibrium in opposition to said orque, said devices comprising means for exerting at one point on said member a force along a line substantially spaced from the center of oscillation of said member and having a horizontal component and a vertical downward component, and means exerting at another point on said member a second force along another line substantially spaced from the center of oscillation of said member and having a horizontal component balancing the horizontal component of the first force and having a vertical upward component balancing the vertical downward component of the first force and the force of gravity, said forces exerting compression upon the portion of the member between said points and said lines of application of the forces varying in direction relative to said member during its oscillations. Claims allowed, 11.

8443. (2) Means and Method of Surveying Wells. G. E. Nevill, San Antonio, Tex., assignor to J. V. Robinson, Montebello, Calif. U. S. 2,369,403, issued February 13, 1945.

The combination with a drill stem and a core-forming drill of magnetic material attached to the lower end thereof and having a central axial opening, of a core-barrel seat formed in the opening, a guide spaced above said seat and axially alined therewith, a dummy core barrel lowerable and removable through said drill stem, a shoulder on said dummy core barrel formed to engage such seat, said dummy core barrel being adapted to be supported in alined position by said seat and guide, a section on said dummy core barrel extending downwardly therefrom and adapted to pass through the axial opening in said drill as said dummy core barrel is lowered into seated position, and a chamber in said section adapted to hold a magnetic-type directional well-surveying instrument therein, said extension section being of nonmagnetic material and adapted to space the compass of the instrument a sufficient distance away from the drill to substantially avoid magnetic interference. Claims allowed, 7.

8444. (2) Method of Determining the Effective Range of Magnetic Detectors. P. P. Horni, Newark, N. J. U. S. 2,378,014, issued June 12, 1945.

A method of determining the desired effective range of a magnetic detector by disposing a source of magnetic energy at a given distance from the coil of a magnetic detector, inserting overlapping laminations within the coil of the detector to form a core for said detector, and moving the overlapping core laminations inwardly or outwardly until the desired voltage is generated in the magnetic detector dependent upon the over-all length of the core, and securely binding the laminations together within the core, whereby the desired effective range of the detector is known. - Claims allowed, 4.

45. (2) Magnetic Field Responsive Device. J. C. Purves, Springfield, Mass., and L. F. Beach, Merrick, N. Y., assignors to Purves Corp., a corporation of Massachusetts. U. S. 2,383,460, issued August 28, 1945.

A magnetic-field responsive device comprising a magnetic circuit aving a pair of substantially parallel elongated arms of magnetically ermeable material, means for producing respective periodically varying luxes instantaneously flowing in opposite directions in respective ones f said arms, said fluxes being of sufficient magnitude to operate said rms in varying permeability portions of their magnetic characteristics, nd a pick-up coil having convolutions each wound about both of said arms, hereby, in the absence of an external magnetic field, the effects of said luxes upon said coil balance out, but in the presence of said external ield a resultant alternating voltage is produced in said pick-up coil aving phase sense and magnitude corresponding to the direction of said ield relative to said arms. - Claims allowed, 19.

446. (2) Quadrantal Corrector for Magnetic Compasses. A. G. McNish, Washington, D. C., assignor to the United States of America, as represented by the Secretary of War. U. S. 2,390,844, issued December 11, 1945.

In combination with a magnetic compass having a needle, means or compensating for quadrantal deviation comprising a mounting stem in he axial line of the compass, a hub mounted for adjustment on and along aid mounting stem, legs extending horizontally and radially from said hub, nd collars of magentic material removably mounted on said legs, the umber of said collars on said legs being variable for permitting correction f both the D and E terms in the compass deviation. - Claims allowed, 3.

447. (3) Loading Basket for Explosive Charges. E. F. Darnell, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. 2,377,763, issued June 5, 1945.

A loading basket for elongated explosive charges equipped at the op with a cap shield and lead anchor having a slot therein comprising in ombination a ferrule for threaded attachment to a loading rod, splayed ods extending from the ferrule and shaped and spaced to loosely conform o the outside of the upper end of the charge, segmental rings connecting he rods together, the upper one being sized to engage the top of said hield to exert downward pressure thereon, and a lug on said top ring to ngage in said shield slot to prevent relative rotation of the charge and asket. - Claims allowed, 9.

448. (3) Blasting Cap. P. E. Narvarte, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. 2,377,804, issued June 5, 1945.

An electric blasting cap, said cap including a conducting shell containing a primer charge, a bridge wire embedded in said primer charge, and conducting leads connected by said bridge wire, insulating sealing means for said shell in which said leads are laid, and means, forming with the shell wall, a sealed chamber containing an ionizable gas affording a high-resistance path between each of said leads and said shell from points on said leads spaced substantially from said primer charge, the resistance of said paths being such as to permit discharge therethrough of electrostatic charges on said leads or shell which establish a high potential difference therebetween, but being appreciably lower than that afforded between said leads and said shell at points adjacent said primer charge, whereby detonation of the cap by electrostatic discharge is precluded. - Claims allowed, 1.

8449. Explosive Cartridge. J. B. Johnson, Wilmington, Del., assignor to Hercules Powder Co., Wilmington, Del., a corporation of Delaware. U. S. 2,378,223, issued June 12, 1945.

A tubular cartridge for blasting explosives, comprising a substantially cylindrical container formed from a rhomboidal sheet wrapped upon itself at least two and a fraction turns, whereby a portion of the container has more than two layers, a line of perforations disposed helically along an interposed layer of that portion of the said container having more than two layers, said line of perforations adapted to tear and thereby enable the cartridge to radially expand when longitudinally compressed. - Claims allowed, 8.

8450. (3) Seismic Prospecting System. E. E. Hoskins, and R. M. Moore, Pasadena, Calif., assignors, by mesne assignments, to United Geophysical Co., Passadena, Calif., a corporation of California. U. S. 2,378,925, issued June 26, 1945.

An apparatus for use in seismic surveying, the combination with a seismometer for converting incoming seismic energy into electrical wave form signals, and means for amplifying and recording such signals, said amplifying and recording means including automatic volume-control devices responsive to variation in received seismic energy, and devices responsive only to received seismic energy of amplitude, which is excessively large as compared to the amplitude of reflected waves, for rapidly reducing the sensitivity of said amplifying and recording means. - Claims allowed, 14.

8451. (3) Vibration Pickup. Howard Carson, Dayton, Ohio, assignor to Research Corporation, New York, N. Y., a corporation of New York. U. S. 2,387,223, issued October 16, 1945.

Vibration-measuring apparatus comprising a casing, a seismic element movable in one direction in the casing, spring supports for the seismic element, each including a plurality of flat split rings, bracket means for connecting the rings of each support, means securing the supports to opposite ends of the seismic element and to the casing, and a rigid member connecting the brackets of both supports. - Claims allowed, 6.

3452. (3) Geological Prospecting System. R. A. Peterson, Pasadena, Calif., assignor to United Geophysical Co., Inc., a corporation of California. U. S. 2,388,703, issued Nov. 13, 1945.

In a method of delineating an ore body, the improvement which comprises generating at a source seismic waves which travel outwardly from the source and are diffracted by an ore body into the shadow zone of the ore body, receiving said diffracted waves at spaced reception points, determining the direction from which the diffracted waves travel to said reception points, plotting on a map coordinated with the region under investigation ray-lines representing the paths of travel of said diffracted waves to said reception points, and determining points of convergence of said ray-lines to locate extremities of the ore body on said map. - Claims allowed, 9.

3453. (3) Amplifier Circuits. H. G. Brinton, Pittsfield, Mass., assignor to General Electric Co., a corporation of New York. U. S. 2,390,773, issued December 11, 1945.

In an amplifier system of the type having a source of variable voltage, a pair of output terminals, and means for impressing a voltage across said output terminals which varies when the voltage of said source varies but by a much greater percentage, the combination of an impedance connected in circuit with said source of variable voltage, said impedance having a non-linear volt-ampere characteristic expressed by the equation

$$I = \left(\frac{E}{C}\right)^{\frac{1}{1-a}}$$

where I is the amperes through it, E is the volts across it, C is its ohmic impedance when carrying one ampere, and "a" is less than 1, a linear impedance connected in series with said non-linear impedance, the value of said linear impedance being so much smaller than the value of said non-linear impedance that substantially all of the voltage of said source of variable voltage is across said non-linear impedance throughout the entire range of variation of said voltage, a second non-linear impedance similar to the first one, means for connecting said second non-linear impedance in a circuit whose voltage is proportional to the current in the said linear impedance, a second linear impedance connected in series with said second non-linear impedance, the value of said second linear impedance being so much smaller than the value of said second non-linear impedance that substantially all of the voltage of the first linear impedance is across said second non-linear impedance throughout the entire range of variation of said voltage, means for obtaining a voltage which is responsive to the current in said second linear impedance, and means for impressing said last-mentioned voltage across said output terminals. - Claims allowed, 11.

8454. (3) Recording System in Seismic Surveying. J. D. Eisler and J. A. Sharpe, Los Angeles, Calif., assignors, by mesne assignments, to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. 2,394,990, issued Feb. 19, 1946.

In apparatus for use in reflection seismic surveying, a set of receptors for temporary records, means for impressing simultaneously on each of said receptors a record corresponding to waves produced by a seismometer or seismometers, the seismometer or seismometers being different for each receptor, a plurality of pickups associated with said receptors and arranged in a plurality of groups, each group comprising pickups associated with a plurality of said receptors, means for imparting related motions to all of said receptors whereby a point on any one of said receptors moves from the position of the impressing means associated with said receptor successively past the positions of the pickups associated with said receptor, electrical means connecting the pickups of each of said groups in a common electrical circuit, and recording means electrically connected with said electrical connecting means for producing simultaneously a plurality of composite records, each of said composite records corresponding to the composited signals picked up by one of said groups of pickups. - Claims allowed, 13.

8455. (3) Method and Apparatus for Seismic Prospecting. Jacob Neufeld, Tulsa, Okla., assignor to Engineering Laboratories, Inc., Tulsa, Okla., a corporation of Oklahoma. U. S. 2,395,289, issued Feb. 19, 1946.

In a method of seismic surveying in which seismic waves originated by a disturbance below the earth's surface are translated into electrical vibrations, the step of producing an electrical effect dependent upon a time derivative of said vibrations, and producing another electrical effect which represents substantially the ratio between said time derivative and said electrical vibrations. - Claims allowed, 6.

8456. (3) Seismic Surveying. O. S. Petty, San Antonio, Tex. U. S. 2,395,427, issued February 26, 1946.

In apparatus for recording seismic waves, the combination with
ans for receiving and transforming seismic waves into electrical wave-
rm signals, of an amplifying and recording system for said signals,
id system including means operable automatically to vary, in respect to
me, the relative response of said system to signals of different frequency.
Claims allowed, 19.

57. (3) Seismic Exploration System. Herbert Hoover, Jr., Sierra Madre, Calif., assignor, by mesne assignments, to United Geophysical Co., Pasadena, Calif., a corporation of California. U. S. 2,395,481, issued Feb. 26, 1946.

In seismic prospecting, the improvement which comprises the
eps of receiving a train of seismic waves, converting the received
eismic waves into corresponding electrical waves, amplifying the electrical
aves, utilizing a predetermined amplification factor for the first portion
f the electrical wave train, shortly thereafter reducing the amplifica-
on factor of the electrical waves to a value which is low relative to
id predetermined amplification factor, and then increasing the amplifica-
on factor of the electrical waves as a function of the time elapsed from
predetermined instant, ultimately increasing the amplification factor
ward the end of the wave train reception to a higher value than the
plification factor utilized in connection with the initial portion of
e wave train, and recording the amplified electrical waves. - Claims
llowed, 2.

458. (4) Process and Means for Measuring Soil Resistivity and Certain Electrical Characteristics Associated With a Buried Pipe Line. G. N. Scott, Beverly Hills, Calif., issued June 19, 1945.

A device for obtaining a substantially continuous record of an
lectrical characteristic of an energized soil over which the device is
dapted to be moved comprising a vehicle, a plurality of electrodes in
ixed separation mounted on and insulated from said vehicle, said
lectrodes being adapted for continuous movement over the surface of the
oil and to make continuous electrical contact with the soil, and a
ecording meter connected to certain of said electrodes, said recording
eter being mounted on said vehicle and the chart of said recording meter
eing adapted to be moved in direct proportion to the forward movement of
aid vehicle. - Claims allowed, 15.

459. (4) Detecting Salt Water Intrusion. C. S. Sanders, Tulsa, Okla., assignor to Stanolind Oil and Gas Company, Tulsa, Okla., a corporation of Delaware. U. S. 2,379,106, issued June 26, 1945.

In apparatus for determining the location of at least one zone of water ingress into a well, including means for displacing the fluids in said well by a conditioning fluid, an electric characteristic of which differs from the same characteristic of said water, an electric cable adapted to be lowered into said well, means for determining the depth of the lower end of said cable in said well, and means for permitting ingress of water into said well after the lower end of said cable has been disposed in the region to be investigated in said well, the improvement comprising a series-connected group of alternate impedances and connectors of considerable length, the ends of which group are connected to two conductors of said cable, each impedance in said group being of different value from that of any other impedance in said group and from any combination of said impedances, a plurality of pairs of electrodes equal in number to the number of said impedances, the electrodes of each pair being connected to the opposite ends of only one of said impedances, a source of potential, means for applying said source across the upper terminals of said cable, and means inserted in said circuit indluding said source, said cable, and said impedances for producing a visible indication of the flow of electric current in said circuit. – Claims allowed, 7.

8460. (4) Method for Making Geophysical Surveys. S. R. Phelan, Memphis, Tenn. U. S. 2,382,093, issued August 14, 1945.

A method of geophysically exploring subsurface earth structures which includes establishing a source of current and a pair of spaced groups of current introduction centers, each group comprising a plurality of individual centers widely spaced apart, connecting one pole of said source to all the said centers of one said group, and the opposite pole to all the said centers of the other said group to establish current flow; establishing a pick-up station in the area of jointly induced potentials about one said group, and making pick-up readings and recordings from currents induced by flow, and subsequently successively singly disconnecting the centers of one said group from and restoring them to connection with said source to vary the pattern of the potentials induced by said group, and making at said station additional readings and recordings during each said disconnection. – Claims allowed, 1.

8461. (4) Well Logging. C. R. Hocott, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. 2,387,513, issued October 23, 1945.

A method for logging wells drilled for oil, which comprises collecting samples of the formation traversed at successive depths during the drilling operation, incorporating a measured amount of each sample into a half cell the potential of which is sensitive to the addition of a minute amount of a reducing component thereto, there being a separate identical half cell for each sample, and comparing the potentials of the half cells so modified with their potentials before modification, whereby the comparisons so made can be correlated with sample depths. – Claims allowed, 9.

462. (4) Electrical Logging Apparatus. G. G. Harrington, Houston, Tex., assignor to Reed Roller Bit Co., Houston, Tex., a corporation of Texas. U. S. 2,388,141, issued October 30, 1945.

In a well-drilling apparatus, a drill stem, a drill bit, a drill ollar having a drill-stem connecting portion and a drill-bit connecting ortion electrically insulated from each other, and having a chamber therein ommunicating with the interior of the drill stem, a housing supported in aid chamber and having a diaphragm positioned for exposure to fluid in aid chamber, means in said housing for vibrating said diaphragm, said eans including a variable-speed electric motor having stator and rotor indings, a source of electric power, and a circuit including said source f power and windings and connecting said source of power directly with ne of said windings, and including means for completing the circuit through he other winding through the formation surrounding said drill collar to ontrol the magnitude of current flowing through the circuit and thereby he speed of the motor in accordance with the electrical characteristics f the formation. - Claims allowed, 4.

463. (4) Electrical Method and Apparatus for Logging Boreholes. C. B. Aiken, North Plainfield, N. J., assignor to Schlumberger Well Surveying Corp., Houston, Tex., a corporation of Delaware. U. S. 2,388,896, issued Nov. 13, 1945.

Apparatus for determining the boundaries of permeable formations raversed by a bore hole containing a column of conductive liquid through hich spontaneous currents flow in the vicinity of relatively permeable ormations comprising: three vertically spaced-apart electrodes adapted o be lowered into said bore hole, means directly electrically connecting aid electrodes, means including at least one nonconducting body having diameter substantially equal to the diameter of the bore hole forming a substantially complete barrier to the flow of electric current through he bore hole liquid between the uppermost electrode and the intermediate lectrode, means including at least one nonconducting body having a iameter substantially equal to the diameter of the bore hole forming a substantially complete barrier to the flow of electrical current through he bore hole liquid between the lowermost electrode and said intermediate lectrode, a fourth electrode in the bore hole spaced laterally from said ntermediate electrode, and means for obtaining indications of the spontaneous potential differences between said intermediate electrode and said ourth electrode. - Claims allowed, 4.

3464. (4) Well Logging. Daniel Silverman, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. 2,389,241, issued November 20, 1945.

Well-signalling apparatus, including an uninsulated conductor xtending into said well, an electrode surrounding said conductor but nsulated therefrom, the effective length of said electrode being substantially greater than its diameter, a step-down transformer the low-urns winding of which is connected between said conductor and said electrode, a source of pulsating electromotive force, a detector of pulsating electric signals, and means coupled to the earth near the head of said well capable of causing current to flow in the earth upon application of pulsating electromotive force to said means, one of said source and said detector being connected to the high turns winding of said transformer and the other of said source and said detector being connected at the surface of the earth to said means. - Claims allowed, 8.

8465. (4) Electrical Well Logging Method and Apparatus. M. E. Chun, LaJolla, Calif., assignor to Lane-Wells Co., Los Angeles, Calif., a corporation of Delaware. U. S. 2,393,009, issued January 15, 1946.

In an apparatus for electrically logging well bores, the combination with an input circuit including a source of electrical energy and a pair of input electrodes, at least one of which is movable along a well bore, said electrodes adapted to establish an electrical field in the formation traversed by the well bore, the combination of a probe circuit comprising: A plurality of probe electrodes adapted to be arranged in said well bore in predetermined fixed spaced relation to a movable input electrode; a measuring circuit including a conductor and a meter responsive to the potential applied to said conductor; a sequencing switch adjacent said probe electrodes for connecting said probe electrodes in succession to the conductor of said measuring circuit; and separate means connected between each probe electrode and said switch for substantially eliminating differences in the potentials applied to said measuring circuit arising from differences in the strength of said electrical field at the different probe electrodes due solely to the differences in their respective distances from said input electrode. - Claims allowed, 4.

8466. (4) Well Surveying Apparatus. J. T. Hayward and E. H. Cooley, Tulsa, Okla.; said Cooley assignor to Engineering Laboratories, Inc., Tulsa, Okla., a corporation of Oklahoma. U. S. 2,396,420, issued March 12, 1946.

An apparatus for continuously determining and recording a property of a substance passing through a process or operation, at a plurality of stages in the operation or process, that comprises means for determining the property at each of said stages in terms of electrical impedance, a bridge circuit for each determining means having said electrical impedance as one of its arms, means to supply electrical power to said bridge circuit, means to automatically vary the impedance of another arm of said bridge circuit to balance it and means to record the variation in the impedance of another arm of said bridge circuit to balance it and means to record the variation in the impedance for each determining device, all upon a single record strip, means affected by any variation from a standard condition of the substance being tested, at each stage where it is being tested, said means being connected to affect the balance of the bridge for the recording means of that stage so as to compensate for any riation from the standard condition of the substance being tested, and ans for shifting at least one recording device relative to the others that all determinations on the same portion of the substance being tested ll be placed alongside of each other or overlying each other on the cord strip, despite the fact that the measurements are made at spaced me intervals as the portion of the substance passes through the operation process. - Claims allowed, 4.

67. (5) Method and Apparatus for Logging Boreholes. Gerhard Herzog, Houston, Tex., assignor to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. 2,378,408, issued June 19, 1945.

A method of logging a bore hole, which comprises passing through id hole a pair of vertically elongated radiation detectors of different ngths, the shorter of said detectors being substantially as long as the rtical dimension of the thinnest stratum to be logged, moving said tectors through the hole at a slower rate when traversing the thinner rata than when traversing the thicker strata, and recording the output said detectors as they are moved through the hole. - Claims allowed, 13.

68. (5) Method and Apparatus for Logging Wells. D. G. C. Hare, Houston, Tex., assignor, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. 2,381,904, issued August 14, 1945.

In an apparatus for measuring variations in radioactivity of the rmation traversed by a bore hole, a housing, a radiation detector in id housing, a wire cable for lowering said housing through the hole and pplying power to said detector and circuit elements in said housing, a cuum-tube circuit in said housing for amplifying the output of said tector, a second vacuum-tube circuit for converting negative potentials om said first circuit to positive potentials, a third vacuum tube nnected to said second circuit for equalizing the pulses from said cond circuit and converting them to a series of interrupted unidirectional lses, an oscillating tube circuit for generating a high-frequency carrier rrent, connections between said third tube and said oscillating-tube rcuit whereby said carrier is modulated by the output of said third be, means in said housing for coupling said modulated carrier to said ble, means for separating said carrier at the surface from power supply ltage and means for indicating level of said carrier. - Claims allowed, 3.

469. (5) Well Surveying. R. G. Piety, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. 2,385,378, issued September 25, 1945.

The method of surveying a well bore to determine at least one lationship of the relationships of approximate depth, approximate linear xtent in depth, and approximate ability to receive additional fluid in situ, of earth formations in the uncased portion of the well, comprising in combination the steps of making a first radioactivity log of the natural radioactivity of the formations in situ in the well, injecting finely divided solid material having radioactivity into a section of the fluid in the well above the portion of the well in which the survey is to be made, forcing the well fluid down and out of the well into such of ~~the~~ earth formations as will receive the well fluid, making a log of the velocity of an interface of said section and the other well fluid, ~~making~~ a second log of the radioactivity of the formations in situ in the well, making at least one later log of the radioactivity to determine leaching, and determining from comparison of said logs at least one of said relationships. - Claims allowed, 9.

8470. (5) Well Logging Method. R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. 2,390,931, issued December 11, 1945.

Method of geophysical exploration which comprises dissolving in the well-drilling liquid a compound of sodium possessing artificial radioactivity produced by activation with alpha rays, whereby quantities of the dissolved material are retained by subsurface strata traversed by the well, removing the said liquid not thus retained, and subsequently logging the well to obtain measurements of subterranean radioactivity correlated with measurements of depth. - Claims allowed, 6.

8471. (5) Radioactivity Well-Logging. L. G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. 2,391,093, issued December 18, 1945.

A method of measuring radiation that comprises subjecting a compressed gaseous medium, in the presence of radiation, to a constant electrical potential sufficient to cause a continuous current flow proportional to the intensity of said radiation, continuously measuring said current flow without appreciably altering the potential on the gaseous medium, and continuously recording the measurement. - Claims allowed, 9.

8472. (7) Analyzing Earth Formations. H. F. Sturgis, Tulsa, Okla, assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. 2,379,045, issued June 26, 1945.

The method for the determination of hydrocarbons in earth formations whichcomprises heating a sample of said earth formation sufficiently to vaporize at least a substantial part of said hydrocarbons, passing said vaporized hydrocarbons into a cooled water immiscible absorption medium whereby said hydrocarbons are absorbed, thereafter passing steam through said heated sample and into said absorption medium whereby hydrocarbons remaining in said sample are vaporized and absorbed in said absorption medium, condensing the steam in said absorption medium, and determining the amount of the hydrocarbons absorbed in said absorption medium. - Claims allowed, 9.

73. (7) Method of Obtaining Soil Gas Samples. W. M. Zaikowsky, Pasadena, and H. E. Metcalf, San Francisco, Calif., assignors, by direct and mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. 2,386,832, issued October 16, 1945.

The method of obtaining a soil gas sample from a core section cated entirely beneath the surface of the earth, which comprises isolat-g such core section in situ against an interchange of gas with adjacent terally disposed soil, stimulating the flow of contained gas from such ction and collecting the same. - Claims allowed, 5.

474. (7) Geochemical Prospecting. E. E. Roper, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. 2,395,014, issued Feb. 19, 1946.

In a method of geochemical prospecting wherein soil gases are alyzed for significant hydrocarbon content as an indication of petro-iferous deposits below the location from which the gases were obtained, aid gases containing relatively unstable impurities which normally, over period of time, decreasingly exaggerate the results of the subsequent alysis for significant hydrocarbon content, the steps of desorbing the ases from the soil, treating said gases, after removal from the soil but efore analysis, with a strong oxidizing agent which is inert toward said gnificant hydrocarbons, said treatment being carried out under such nditions that said impurities are largely removed from the gases, the reated gases being protected pending analysis from contamination by her hydrocarbon containing gases, whereby the subsequently obtained alytical result will be more reliable. - Claims allowed, 7.

475. (8) Well Surveying Instrument. R. D. Agnew, Coalinga, Calif., assignor to Schlumberger Well Surveying Corp., Houston, Tex., a corporation of Delaware. U. S. 2,378,526, issued June 19, 1945.

In apparatus for determining the inclination of a bore hole, he combination of a casing adapted to be lowered into a bore hole with ts axis maintained in fixed relation to the axis of the bore hole, hotosensitive means mounted in the casing, a pendulum swingably mounted n the casing above said photosensitive means, means in said pendulum or directing a beam of radiant energy axially of said pendulum from its ower end to said photo-sensitive means, and a member mounted between said endulum and said photosensitive means for modifying the intensity of he beam in accordance with the inclination of the bore hole, said member aving one degree of transparency in the central portion thereof and ifferent degrees of transparency at zones concentric with, and spaced at ifferent radial distances from, said central portion. - Claims allowed, 2.

8476. (8) Geophysical Prospecting Apparatus. A. F. Hasbrook, San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. 2,383,966, issued September 4, 1945.

Apparatus for geophysical prospecting on the floors of bodies of water comprising, in combination, a water-tight housing, means to support the same rigidly on such a floor, a cased geophysical instrument in said housing, gimbals supporting the instrument casing for self-leveling within the housing, a plurality of clamping devices each including means adapted to be extended between the housing and casing to lock them against relative movement, a motor adapted to move each of said means slowly, a control to start the motors from the water surface, and means to stop each motor automatically when its clamping means contacts one of the parts to be clamped together. - Claims allowed, 11.

8477. (8) Geophysical Prospecting Apparatus. A. F. Hasbrook, San Antonio, Tex., assignor to O. S. Petty, San Antonio, Tex. U. S. 2,384,739, issued September 11, 1945.

Apparatus for geophysical prospecting on the floors of bodies of water comprising, in combination, a water-tight housing, means to support the same rigidly on such floor, a geophysical instrument in said housing, gimbals supporting the instrument for substantial self-leveling within the housing, means carried by said instrument to detect out-of-level conditions thereof, a weight carried by said instrument and movable to positions to correct the balance and level of the casing, and devices responsive to the detecting means on occurrence of out-of-level conditions for displacing said weight to cause the instrument to swing in said gimbals to a level position. Claims allowed, 5.

8478. (8) Acoustic Logging. J. E. Walstrom, Houston, Tex., assignor to Schlumberger Well Surveying Corp., Houston, Tex., a corporation of Delaware. U. S. 2,396,935, issued March 19, 1946.

Apparatus for investigating earth formations traversed by a bore hole, comprising first wall-engaging means adapted to be moved through the bore hole in engagement with the wall thereof and being relatively smooth where it engages said wall, second wall-engaging means movable with said first wall-engaging means and having a cutting endge where it engages the wall of the bore hole, vibration responsive means associated with each of said wall engaging means, and means for indicating the responses of said respective vibration responsive means. - Claims allowed, 6.

8479. (9) Short Time Interval Meter. H. L. Clark, Ballston Lake, N. Y., assignor to General Electric Co., a corporation of New York. U. S. 2,377,757, issued June 5, 1945.

In a time interval meter, a condenser, a source of direct-current upply, a circuit including switching means for connecting said condenser n charging relation with said source during a time interval to be measured, means for assuring a definite initial charge on said condenser at the time of making such time-measurement connection, and regulating means for maintaining the charging rate of said condenser constant during such time-measurement connection. - Claims allowed, 11.

480. (9) Transient Signal Recording-Reproducing Device. J. P. Arndt, Jr., Euclid, Ohio, assignor to The Brush Development Co., Cleveland, Ohio, a corporation of Ohio. U. S. 2,378,383; issued June 19, 1945.

In a system for studying transient signal occurrences and ssociated with a source of at least a first transient signal and second ransient signal: an endless cyclically moving recording medium of a imited reproducibly recordable frequency range; carrier frequency supply means for supplying a first carrier current of a first frequency and a second carrier current of a second frequency differing from said first requency, each of said carrier currents being of a frequency reproducibly recordable on said moving recording medium; modulating means for modulating the first carrier current by the first signal and providing thereby a corresponding first modulated signal and for modulating the second carrier current by the second signal and providing thereby a corresponding second modulated signal; recording means for recording on said medium signals corresponding to said first signal and second signal; reproducing means including demodulating means for cyclically reproducing from said medium the recorded signals and for cyclically supplying from the reproduced signals a first reproduced signal corresponding to said first signal and a second reproduced signal corresponding to said second signal; and cyclically operative indicating means cyclically actuated by said different reproduced signals for simultaneously visually presenting images corresponding to the different signals reproduced from the cyclically moving medium. - Claims allowed, 15.

3481. (9) Recording and Reproducing Device. S. J. Begun, Cleveland Heights, Ohio, assignor to the Brush Develpment Co., Cleveland, Ohio, a corporation of Ohio. U. S. 2,378,388, issued June 19, 1945.

In a system for recording a transient circuit condition which may occur in an electric circuit at an unpredictable instant and for reproducing the record; an endlessly operating, cyclically effective recording medium; recording means connected to the circuit in which a transient is expected for continuously recording the circuit conditions; means for obliterating the recorded signal; means responsive to an occurrence of a transient circuit condition for rendering the obliterating means inoperative; means operative a time interval thereafter for rendering the recording means inoperative so as to retain on said recording medium a record corresponding to said transient condition; and reproducing means operative to cyclically reproduce the record recorded on said recording medium. - Claims allowed, 31.

8482. (9) Recording-Reproducing Device. S. J. Begun, Cleveland Heights, Ohio, assignor to The Brush Development Co., Cleveland, Ohio, a coporation of Ohio. U. S. 2,378,389, issued June 19, 1945.

In a system for reproducing characteristic images of transient electric occurrences of an electric circuit system which operates under predetermined normal conditions: a plurality of electric transmission channels connected to pass a first electric transient occurrence and a second electric transient occurrence; an endlessly acting magnetic recording medium having a given recording length; driving means for driving said recording medium so that it operates during a continuous period in successive cycles throughout its length; recording means for magnetically recording on said medium said first and said second transient occurrences; obliterating means for obliterating the magnetic records of said recording medium; trigger means interconnected to control the operation of said recording means and said obliterating means; said trigger means being operative to cause said recording means to continuously record on said medium electric occurrences passed through said channels; said trigger means being operative in response to a transient occurrence passed through a channel to stop the obliterating operation and recording operation. - Claims allowed, 5.

8483. (9) Gun Perforator. Marcel Schlumberger, Paris, France. Vested in the Alien Property Custodian. U. S. 2,381,081, issued August 7, 1945.

A well-casing perforator which comprises at least one body member provided with at least two distinct powder-chambers extending substantially longitudinally therein and located in peripheral regions thereof, with their transverse axes in close proximity to each other, and means forming at least one berrel hole extending from each of said chambers to the outer wall of said body member and passing through the central portion thereof. - Claims allowed, 25.

8484. (9) Device for Viewing Underwater Bodies. E. R. F. Johnson, United States Navy. U. S. 2,396,267, issued March 12, 1946.

In an apparatus for viewing an underwater body at a distance in turbid water and having an air chamber provided with a viewing location for receiving an objective lens for viewing the body, the combination of a hollow, closed member covering and alined with said location and displacing a sufficient portion of the turbid water from the cone of vision from said location to embrace an angle on the order of said cone of vision, the member extending a substantial distance from said location and pproximately to said body to be viewed and having a transparent forward d wall aligned with said location and substantially coinciding with said ne of vision, and a clear liquid confined by said member and having nerally the same index of refraction as the water, said liquid substantially filling the member whereby the apparatus is of substantially e same specific gravity as the water. - Claims allowed, 5.

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I. C. 7386 November 1946

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 125

APRIL - JUNE 1946

BY

V. L. SKITSKY

C. 7386,
vember 1946.

INFORMATION CIRCULAR

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 125
April - June 1946[1]

Compiled by V. L. Skitsky[2]

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FOREWORD

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Washington 25, D. C.

1. GRAVITATIONAL METHODS

8485. Forbush, S. E. Gravity Determinations on the Carnegie. Scientific Results of Cruise VII of the Carnegie during 1928-29. Carnegie Institution of Washington, Pub. 571, 1946, pp. 69-81.

Observations made during the 7th cruise of the Carnegie, 1928-29, included gravity determinations. These were the first measurements of their kind aboard a sailing vessel at sea. A Meinesz gravity apparatus was installed at the ship's center of oscillation; it consisted of three nearly isochronous pendulums swinging in the same vertical plane. The equipment also included chronometers, photographic recorder, time-signal amplifier, radio apparatus, etc. When at sea, the aural method was used, which is the same as for coincidence determinations between two chronometers. The theory of the apparatus, effects of vertical acceleration and angular movements, tests, records, and reductions are discussed, and the method of observation and behavior of the apparatus aboard ship are described.

Few successful determinations were obtained at Pago Pago, Penryhn, and at sea; they are tabulated. Various difficulties of gravity measurements were studied and some of them eliminated. - V. S.

8486. Kogbetliantz, E. G. Estimating Depth and Excess-Mass of Point-Sources and Horizontal Line-Sources in Gravity Prospecting. Geophysics. Menasha, Wis., vol. 11, No. 2, 1946, p. 195-210.

The problem of the exact quantitative determination of the depth and total excess mass M of a point- and a line-source is solved with the aid of moments of the mapped gravity anomaly gm, the correction for the regional anomaly being supposed as already applied. The solution does not presuppose that the constant error E in the regional datum is zero, and this error is deduced from the gravity map itself. The relative errors that may affect the given estimates of p, M, E are studied, and the magnitude of their upper imits is estimated in the case of a point-source only, as the same analysis an easily be extended to a line-source. The recommended method of solution educes the harmful influence of extraneous anomalies from shallow mass oints. The details of mathematical proofs are given in an appendix. Author's bs.

487. Marcantoni, A. Sulla localizzazione di un corpo sferico e assimilabile ad una sfera mediante misure eötvössiane (On Locating a Spherical Body Identifiable with a Sphere by means of the Torsion Balance of Eötvös). Geofis. Pura & Appl., Milano, vol. 2, 1940, No. 2, pp. 113-120, Nos. 3/4, pp. 200-215.

Part 1. The author demonstrates that it is possible to prove the existence of an anomalous spherical body in the subsurface from the values of ötvos derivatives. One needs first to satisfy the necessary equations; then it is only necessary to occupy two stations for determining and locating the ody's mass. The equations are deduced.
Part 2. Several formulas are presented for calculating the mass and he coordinates of the position of a sphere approximating closest the anomalous subterranean body surveyed by torsion-balance. - Author's abstracts, ranslated by V. S.

488. Medina, M., Carreno, A., and Toscano, R. La gravimetria en Mexico (Gravimetry in Mexico). Direccion de Geografia, Meteorologia, e Hidrologia; Estudios y Resultados de las Determinaciones Gravimetricas, Mexico, 1944, 151 pp.

The Mexican report to the second Panamerican Conference on Geography nd Cartography deals with gravimetry. (1) M. Medina traces the progress of ravity investigations in Mexico from 1866 to the present time, illustrating he results by an isoanomaly map based upon observations at the Mexican stations; the principal zero-anomaly curve is found to follow closely the volcanic axis of Mexico. (2) A. Carreno presents a mathematical derivation of he potential of gravity and the principal formulas for theoretical gravity. e also discusses isostatic-reduction formulas and anomalies, various instruments for gravity determinations, computation of results, and interpretation. (3) R. Toscano gives tables for correction for topography and compensation and discusses the formulas he employed for their computation; these esemble closely Hayford's formulas. (4) An appendix to Carreno's discussion ontains C. Becerrill's demonstration of the fundamental theorem of the imple pendulum. (A review of this report appeared in Trans. Am. Geophys. nion, vol. 26, No. 3, 1945, p. 346). - V. S.

3489. The Mining Magazine, London. Craelius Co. issue a Catalogue on Geophysical Surveying. Vol. 74, No. 4, 1946, pp. 246-247.

The essential feature of the Nørgaard gravimeter comprises a nearly orizontal quartz pendulum supported on a horizontal torsion fiber of fused uartz fixed in a quartz frame. This whole system is immersed in a liquid and completely enclosed in a thick copper casing. A small glass window is provided in the casing, through which the pendulum may be observed by means of a microscope and a system of mirrors. The casing is protected against outside temperature variations by thick insulation, which eliminates the risk of error due to temperature gradients within the instrument. Observations consist in measuring the angle of displacement from the horizontal of the quartz system about an axis parallel to the torsion fiber when the torque exerted by the pendulum, due to gravity, is balanced by a predetermined torque in the fiber. This angle is measured by micrometer with an accuracy of approximately 0.3 to 0.4 second of arc, which corresponds to an accuracy in gravity determination of about 0.03 to 0.04 mgal. for one observation.

In field work, an accuracy of ±0.014 mgal. has been obtained in the determination of the gravity difference between stations half a mile apart. When referred to one station only, this figure would be 0.01 mgal. The time for setting up, taking observations, and moving out from the station is 4 to 5 minutes. The high speed and accuracy of the instrument and the small need for repetitions at base points are advantages that recommend its use also for commercial geophysical work. - Excerpts from catalogue.

8490. Rankine, A. O., and Evans, P. Geophysical Prospecting for Oil in India. Petroleum Times, London, vol. 50, No. 1,272, 1946, pp. 432-434.

In India, the alluvial regions inaccessible to geological methods have been explored geophysically. Beginning in 1923, the Burma Oil Co. conducted a series of torsion-balance and resistivity surveys in Assam, the Digboi area, and other regions, but found no oil. Then, in 1938, a complete gravity survey of all promising alluvial parts of India and Burma was undertaken, and a local seismic survey was carried out in Assam. Torsion balances and Holweck, Ising, and Thyssen gravimeters served for the work; seismic-reflection parties sounded the areas selected for detailed exploration. Exploration continued into 1939, covered 22,000 stations over an area of 330,000 square miles, but had to be suspended because of the war. All the results so far obtained have been negative. However, the gravity data suggest several promising areas; they have a general scientific value in that they establish a connection between the gravity features of India, Burma, and the seas near the Netherlands East Indies investigated by Vening Meinesz. The present plans call for a resumption of exploration. - V. S.

8491. Schiflett, H. L. Quantitative Interpretation of Gravimetric Data (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 101.

This paper suggests methods of interpreting gravity data gathered in two widely separated provinces. The first area considered is peninsula Florida, where little seismic and geological information is available. The second area investigated is part of the Permian Basin in west Texas where, over a period of years, considerable geological and other information has been developed. - Author's abs.

92. Vening Meinesz, F. A. Fundamental Tables for Regional Isostatic Reduction of Gravity Values. Verh. Kon. Nederlandsche Akad. Wet., Amsterdam, vol. 17, No. 3, 1940, pp. 1-44.

The local isostatic reduction of gravity values adopted in most current
bles is based upon the assumption that separate vertical columns of the
rth's crust gain isostatic equilibrium independently of one another. This
pposition does not correspond to actual conditions, because the strength
the crust prevents a local adjustment. In 1931, the author proposed a
thod of regional isostatic reduction that avoids these difficulties, and
1940 he published general tables for such reduction. A summary is pre-
nted of the method and formulas employed for the computation of these tables
d of the main intermediate stages of the computations. - V. S.

93. Wen-Po, Weng. Gravitational Data from the Nan Shan Range. Nature, London. vol. 157, No. 3,991, 1946, p. 549

The study of the gravitational data obtained in the front of the Nan
an Range, China, reveals interesting facts about the crustal structure of
e earth. The variation of the gravitational acceleration was measured by
atic gravity meters with a sensitivity of 0.1 mg., and the elevation of
e stations was determined by a transit to within a few feet. The gravity
riation of long linear traverses, after reduction to one common latitude,
plotted separately against the elevation of the stations. The results
ow that the isostatic compensation and the free air reduction of the ele-
tion fit well in front of the main range. Beyond a sharp boundary, how-
er, the picture changes. Typically, the Bouguer reduction becomes the
ntrolling factor. The data also confirm the current conception that minor
nd features like the front range, which may be 30 to 70 miles in base and
re than 1,500 feet above the surrounding country, is not even slightly
mpensated in isostasy. Examples are given. - Abridged by V. S.

494. Wilson, G. M. Diving Chamber Permits Gravity Meter Surveys on Ocean Bottom. Oil Weekly, Houston, Tex., vol. 121, No. 9, 1946, pp. 22-23.

A diving chamber has been developed for gravity surveys under water.
his vessel is constructed of 0.5-inch steel plate, measures 5 by 3 feet,
nd withstands pressure at depths well over 100 feet. It houses an operator,
ravity meter, instruments, air-purifying devices, emergency oxygen, test
pparatus, and communication facilities. A circular lead weight attached to
he bottom provides stability during hoisting and measurements; it can be
eleased in emergencies to allow the vessel to rise to the surface by its
wn buoyancy. The chamber is operated from a barge carrying a boom and
igging equipment.

Extensive tests conducted recently off the California coast at depths
f 25, 35, and 160 feet gave satisfactory results. The chamber will be used
or gravity surveys off the Louisiana coast. - V. S.

2. MAGNETIC METHODS

8495. Afanasieva, V. I. Spherical Harmonic Analysis of the Earth's Magnetic Field for Epoch 1945. Terr. Magn. & Atmos. Elect., Baltimore, Md., vol. 51, No. 1, 1946, pp. 19-30.

In 1944, the USSR Institute of Terrestrial Magnetism prepared world magnetic charts for declination, inclination, and horizontal intensity for epoch 1945. They were based on British, American, and Russian data. The Russian material totaled 23,000 magnetic determinations and gave a picture of the USSR considerably different from that found on previous world charts. In view of this difference, the author makes a new spherical harmonic analysis of the earth's magnetic field, using Schuster's method of development revised by Schmidt. The mathematical derivations are presented, together with tabulations of the results obtained for geomagnetic components, constants, coefficients, etc. The H-data for 1885, 1922, and 1945 show that the earth's moment has decreased during 1922-45 three times slower than during 1885-1922. A comparison of the residual field for 1945 with the residual fields for the preceeding epochs indicates that regional anomalies hold their position on the earth but change in intensity. - V. S.

8496. Baker, G. J. Dimensions and Units of Electromagnetic Quantities. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 373-384.

A brief history is given of the confusion in the literature in regard to c.g.s. electromagnetic units, and some inconsistencies are pointed out. It is contended that most geomagnetic measurements are of the flux density B rather than of H, and that the gamma is correctly regarded as equivalent to 10^{-5} gauss. Dimensions of the important electromagnetic relations between m.k.s. units and electromagnetic and electrostatic c.g.s. units are set forth. The adoption of m.k.s. units is urged, as they are particularly advantageous to engineers. - Author's abs.

8497. Eblé, L. Variation diurne de l'agitation magnetique (Diurnal Variation of Magnetic Disturbance). Ann. Inst. Phys. Globe, Paris, vol. 21, 1943, pp. 88-99.

A previous investigation of diurnal magnetic variation for the period 1917-27 indicated that the disturbance is least in the morning and largest at night, develops earlier during mornings and more strongly at night in the winter, and does not change appreciably from year to year. To verify these conclusions, the observations were continued during 1928-1938. They are tabulated and plotted for annual winter, spring, summer, and fall periods. Statistical analysis covers determination of character figures frequency of different degrees of disturbance; effects of solar activity, and comparison of methods of observation. The results point to the existence of two independent components in magnetic disturbance. The morning disturbance s short, regular, and results from solar action on the ultraviolet radia- ion. The night disturbance is prolonged, irregular, and results from the ombined action of ionized atmosphere and extraterrestrial currents. Mag- etic storms form a third group of disturbances. - V. S.

498. Eckhardt, E. A. The Airborne Magnetometer (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98.

The advent of this new instrument opens up new possibilities in mag- etic prospecting. The nature of the information provided by it and the perating advantages it affords are discussed. Discussion of the instru- entation involved will have to be deferred. - Author's abs.

499. Evrard, Pierre. Les courbes d' anomalies magnétiques horizontale et verticale dues a une couche mince incline (The Curves of Horizontal and Vertical Magnetic Anomalies Caused by a Thin Inclined Layer). Bull. Soc. Roy. Sci. Liége, Belgium, Feb. 18, 1943, pp. 103-108.

The relationship existing between the horizontal and vertical values f magnetic anomalies caused by a thin inclined layer was originally formu- ated by F. Haalck. Applying simplifying assumptions, the author reduces his relationship to an expression lending itself to simple graphic presen- ation. The mathematical deductions are given, the method of a simultaneous lotting of horizontal and vertical values is explained, and the resulting urves are illustrated by a drawing.

Two of the equations employed permit checking the precision of the zero evel of anomaly curves for every station occupied during a survey. Equa- ions also show that the amplitudes of horizontal and vertical anomalies ecome equal in the case of identical profiles. As the maximum and the inimum of a curve depend on local conditions and may be determined with ifferent precision, it is essential to make both horizontal and vertical easurements in order to use, if necessary, the maximum of one curve and he minimum of another. - V. S.

3500. Gassmann, F., and Niggli, E. Magnetische Untersuchung von Eisenerzen (Magnetic Analysis of Iron Ores). Verh. Schweizerischen Naturf Ges., Geneva, 1944, pp. 105-106.

The geological interpretation of magnetic anomalies detected by pros- ecting is made more certain and precise by a knowledge of the magnetic roperties of rocks in the region surveyed. To accumulate such information, the Swiss E.T.H. Institut für Geophysik has recently conducted a comprehen- sive investigation of the ore outcrops in the Alps. Magnetic and petro- graphic analyses were made of the ore samples collected. The magnetic anal- yses consisted in determining the susceptibility and the remanent magnetiza- tion of oriented cores by magnetic variometers and testing the pulverized ore. - V. S.

8501. Gebhardt, R. E. An Induction Magnetometer: Construction and Tests. Nat. Res. Council, Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 1, 1946, pp. 53-58.

Constructional details and results of tests of an induction magnetometer for measuring all components of the geomagnetic field are discussed. Standardization through preliminary base-line values at the Cheltenham Magnetic Observatory, obtained with the Carnegie Institution of Washington sine-galvanometer, shows only small corrections to the computed constants in all elements. Largest corrections appear in Z and F. If base-line values are obtained by the induction-magnetometer and the magnetograms used only to tie in measurements of different elements, the value of F as observed differs by only two gammas from that computed from the observed values of H and Z. Author's abs. (See also abs. 8508 in this issue. - V. S.)

8502. Hawkes, H. E., and Balsley, J. R. Magnetic Exploration for Iron Ore in Northern New York. U. S. Geological Survey, Washington, D. C., Strategic Minerals Investigations, Prelim. Rep. 3-194, 1946, 9 pp.

In 1945, a magnetic reconnaissance was made in the northern Adirondacks, New York, in quest of iron ore; favorable conditions were sought in predominantly igneous terrain. There followed detailed dip-needle surveys of 50 promising anomalies. The traverses were located on the basis of sun observations, magnetic observations, and airplane photos, depending upon the character of the relief. Base-station measurements served for correcting the readings of the different dip needles employed simultaneously. Ten of the surveys detected iron ore. The newly discovered anomalies are described, their characteristics tabulated, and dip-needle maps appended. - V. S.

8503. Hurwitz, Louis, and Howe, H. H. Magnetic Observatory Results at Tucson, Ariz., for 1937-38. U. S. Coast and Geodetic Survey, Washington, D. C., MO-23, 1944, 102 pp.

This publication contains extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, lists of principal magnetic disturbances, amounts of noncyclic change, observed and adopted base-line values of the D, H, and Z variometers with their abrupt changes, etc. The text includes a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Authors' abs.

8504. Jenny, W. P. Structural Interpretation of Micromagnetic and other Data. Oil Weekly, Houston, Tex., vol. 119, No. 6, 1946, pp. 40-45.

The interpretation of micromagnetic and gravity data is discussed for six surveys in Michigan and the Gulf States. The geological conditions here

countered had tested the micromagnetic method on a wide variety of struc-
res, as evidenced by the magnetic isogams and profiles presented.
It is found that interpretation depends, as a rule, upon regional mag-
tic conditions. Under some conditions, positive micromagnetic anomalies
licate structural highs and under other conditions, structural lows.
rtain observations are particularly worth noting: In regions where posi-
ve anomalies point to structural highs, a salt uplift may be represented
a negative local anomaly; a very large displacement along a fault may
sult in a shallow magnetic bed on its downthrown side and none on the up-
rown side, with a possible reversion of the magnetic throw. Other obser-
tions are given. Various geological conditions are best suited for dif-
rent geophysical methods, and combined data provide the surest basis for
terpretation. - V. S.

05. Kienow, Sigismund. Erdmagnetische Vermessung der Basaltvorkommen bei Bad Bertrich (Geomagnetic Survey of the Basalt Outcrops near Bad Bertrich). Jahrbuch der Reichsstelle für Bodenforshung, 1939, vol. 60, 1941, pp. 99-117.

In 1937, a magnetic survey was made of the basalt outcrops uncovered
erosion near Bad Bertrich, Mecklenburg. It purported to verify and com-
ete the geological work of I. Ketin. The Askania balance served to meas-
re vertical intensity over stations disposed at an average interval of 30
les. The precision of measurements is indicated and the theory of mag-
tic anomalies discussed. The results showed that the magnetic suscepti-
lity of basalt is higher than that of the surrounding tuff and Devonian
ck. The basalt outcrops registered high positive values and the neighbor-
ng areas, mostly negative values, with maxima of anomalies averaging about
,000 gammas. As a result, the basalt deposit could be clearly delineated
y means of iso-anomalies. Findings are analyzed and interpreted morpholog-
cally. - V. S.

506. Logachev, A. A. The Development and Applications of Airborne Magnetometers in the U.S.S.R. Geophysics, Menasha, Wis., vol. 11, No. 2, 1946, pp. 135-147.

These three papers by A. A. Logachev describe the pioneer work by the
ussians in magnetic exploration with airborne equipment. Partly because of
he language, and partly because of the obscurity of the journals in which
t was published, information on this work has not been widely circulated
mong American geophysicists. It is hoped that these translations will be
f historical if not of practical interest to the profession. - H. E.
awkes, translator.
The papers in question appeared in Russian journals in 1936, 1937, and
940. Abstracts of them will be found in Geoph. Abs. 87, No. 3282; G. A.
0, No. 3832; and G. A. 102, No. 5618. - V. S.

8507. Magnee, I. de. Les methodes d'exploration géophysiques et le laboratoire de géologie (Geophysical Methods of Exploration and the Geological Laboratory). Bull. Soc. Belge Géol., Paleont. & Hydrol., Brussels, vol. 53, No. 3, 1945, pp. 199-208.

Some of the methods of geophysical exploration are so simple and cheap that they can be used by geologists without special preparation. Particularly adequate for such purpose are the magnetic method and various electrical methods, all suitable for metals exploration. To overcome existing prejudices and bring about broad acceptance and application, the author outlines these methods with respect to principles, instruments, and field techniques. For magnetic surveys, he suggests the balance of Ad. Schmidt; for electrical surveys, the equipotential, resistivity, and sounding methods. Concrete examples of exploration illustrate the discussion. The current techniques of such exploration are now so improved and standardized that the geological divisions of industrial companies and the departments of universities may well include them among their routine tools. - V. S.

8508. McNish, A. G. An Induction Magnetometer: Principle of Operation. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 1, 1946, pp. 49-51.

A simple form of a saturated-core induction-type magnetometer is described, and the principle of its operation is briefly discussed. This version of the instrument employs no electronic components. Possibility of its application as a universal instrument for geomagnetic measurements is suggested. - Author's abs.

8509. Modriniak, N. Geophysical Investigations and Drilling Results East of Karapiro Dam. New Zealand Jour. Sci. Tech., Wellington, vol. 27, No. 3 B, 1945, pp. 218-223.

Results of magnetic and seismic observations are shown on the maps and briefly discussed. Positions of bores are shown, logs tabulated, and important implications pointed out. Trenches indicate that the depressions on the pumice terrace east of Karapiro Dam are probably of Maori origin. - Author's abs

8510. Morelli, C. Misure magnetiche in Albania (Magnetic Measurements in Albania). Geofis. Pura & Appl., Messina, vol. 6, Nos. 1-2, 1944, pp. 1-2, 14-22.

The Italian Military Geographical Institute has made magnetic surveys in Albania. Absolute values D, H, and I were measured at 65 stations disposed at about 20 km. one from another. They revealed two zones of extensive anomalies in northern and southeastern Albania caused by eruptive rocks of the Eocene. Moreover, three pronounced regional anomalies were noted in the general region of Scutary, Kruja, Korcia, and Valona; two of them are parently due to basic rocks at a depth of several kilometers. The results f the survey have been embodied in a magnetic map drawn on a scale of 1: 0,000, with isolines for 1942.0. - V. S.

511. Nelson, J. H., and Campbell, J. B. Additional Data on the Spontaneous Increase of Magnetic Moment. Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 3, 1945, pp. 379-380.

The long cobalt-steel magnet of the Cooke-type magnetometer in use at ne Tucson Magnetic Observatory since 1940 has shown an increase of moment ince 1943 (Geophys. Abs. 116, No. 7270). The observations and curves reorted at that time pointed to a relation between the residual seasonal hange of the moment and seasonal temperatures. Additional data gathered ince then are now presented in the form of observed and adjusted graphs. ne curve of the Log M_{20} (adjusted) shows that the increase of magnetic oment was greater during 1939-40 than during 1941-42. This decline enables ne authors to predict that the moment will cease to increase within the ext 2 to 3 years. The temperature curve stands in a changing phase-relation o the magnet's curve and points to an error in the temperature coefficient f the magnet, not in excess of 3 percent. The procedures of magnetic and hermal observations are indicated and the data discussed. - V. S.

512. Nicholson, G. B. Airborne Magnetometer Expedites Geophysical Surveys. Oil Weekly, Houston, Tex., vol. 122, No. 1, 1946, pp. 29-32.

During the war, several laboratories in the United States developed irborne magnetometers for submarine detection. The magnetometer here decribed is the U. S. Naval Ordnance and Bell Telephone model adapted for eophysical exploration with the assistance of the U. S. Geological Survey nd other agencies. It is made highly sensitive to magnetic bodies by pecial fluxgates responding to anomalies of an intensity as low as one amma. Detection is accomplished by an electronic recorder of the magnetic ield and a strip camera photographing location; both are operated continuusly.

The entire detector apparatus is housed in a bomb-shaped, streamlined apsule made of nonmagnetic plywood, measuring 6 feet in length and weighing 50 pounds. It is either trailed behind a twin-engine plane on an electric ow cable 100 feet long or mounted in a special extension from the tail ection. The head of the capsule houses a gimbal mechanism orienting the agnetometer in flight. A radio altimeter in the plane's cabin makes it ossible to fly at a height of about 1,000 feet so as not to exceed the ange of the magnetic sensitivity of the fluxgate detector. The magnetic eadings and corresponding ground locations eventually are plotted in the orm of an isogam contour map.

The Geological Survey and the Navy conducted numerous test flights over egions known to contain iron and oil in Pennsylvania, Michigan, Oklahoma, yoming, Maryland, New York, Alaska and over the continental shelf of the ulf of Mexico and obtained satisfactory results. Certain techniques as to the spacing of traverses, speed and altitude of flight, etc., are being developed. An airborne magnetometer survey has been 17 times cheaper than a ground reconnaissance survey with a dip needle. It has been 150 times as fast in the Adirondacks mountains. (See also abs. 8619 in this issue.) - V. S.

8513. Omer, G. C., Jr. Seismic Areas and Secular Magnetic Variations. Bull. Seism. Soc. America, Berkeley, Calif., vol. 36, No. 1, 1946, pp. 21-29.

A good geographical coincidence is observed to exist between areas of anomalous change in the earth's secular magnetic field and the western Indian Ocean, the mid-Atlantic Ridge, and the Easter Island Ridge seismic zones. Suggestive relationships are noted between changes in the earth's secular magnetic field and other areas of shallow seismicity. - Author's abs.

8514. Rougerie, Paul. Contribution a l'etude des courants telluriques (Contribution to the Study of Telluric Currents). Ann. Inst. Phys. Globe, Paris, vol. 20, 1942, pp. 60-104.

The correspondence observed between magnetic and telluric variations has lead to the hypothesis that geomagnetic fluctuations are caused by telluric currents. To verify such possibility, the author made a study of diurnal telluric variation measured at the Observatoire du Parc Saint-Maur during 1893-98 near Paris. The data on the average hourly differences in registered potential and the derived indices are tabulated and plotted. Consideration is given to harmonic and vector analysis of diurnal telluric variation, direction of current, comparison of the harmonics of variation of the magnetic declination and the meridian telluric component, theoretical induction and telluric currents, etc. The components of the telluric current have the average values: N = 1.04 mv./Km. and E = -0.83 mv./Km.

The results show a coincident variation of the horizontal magnetic component H and the telluric component E, and of the magnetic declination D and the telluric component N; an increase in electromotive force toward N-E corresponds to a decrease in both magnetic elements. The indications are that telluric and magnetic variations have a common cause and that their mutual relation is complex. There is, however, no proof of a cause-effect dependence between them. The paper is supplied with bibliography. - V. S.

8515. Scott, W. E. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for October to December 1945, and Summary for Year 1945. Terr. Magn. & Atmos. Elect., Baltimore, Md., vol. 51, No. 1, 1946, pp. 57-66.

Tables and diagrams of magnetic character-figures are given with explanatory text. The minimum of magnetic activity for the current sunspot-cycle was reached during June to November 1945. There were no magnetic isturbances during May, June, July, and August 1945, and the few storms that ccurred were distributed about equally in the winter and equinoctial months. uiescent periods persisted for many solar rotations. - V. S.

516. Swainson, O. W. Magnetic Work of the United States Coast and Geodetic Survey from April 1944 through March 1945. Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 3, 1945, pp. 447-450.

During the year 1944-45, the Section of Geomagnetism, U. S. Coast and oedetic Survey, carried on magnetic surveys and related work largely for he use of the military services. The magnetic surveys were made in the nited States, Brazil, Chile, Costa Rica, Galapagos Islands, Guatemala, Honuras, Mexico, Nicaragua, Panama, and Peru, extending as far south as Punta renas on the Straits of Magellan; they consisted mainly of repeat observaions for the compilation of charts. In the United States, the work on the 945 isomagnetic charts begun in 1943 was completed, occupying in all 200 tations. In Alaska, a partial repeat survey gave valuable information on ecular change. The year's observations are tabulated. The data obtained ere disseminated, instruments were developed, publications were prepared nd published, and observatory operations were continued. - V. S.

3517. Wall, T. F. The Mechanism of Magnetization. Pts. 1-4. Engineer, London, March 22-29, April 5-12, 1940, pp. 273-276, 294-297, 318-320, 342-344.

Magnetization of steels and alloys affects their properties and plays a role in many problems, among them the precision of scientific instruments. The entire phenomenon has been extensively studied, but the formulation of results is very incomplete. To aid the practical application of accumulated knowledge, the author presents a concise theory of magnetization largely reduced to mathematical expression. It covers the characteristics of magnetization, self-demagnetization, influence of temperature, magnetostriction, remanence, initial permeability, coercive force, and the effects of surface treatment. - V. S.

3. SEISMIC METHODS

8518. Bernard, Pierre. Etude sur l'agitation microseismique et ses variations (A Study of Microseismic Disturbance and its Variation). Ann. Inst. Phys. Globe, Paris, vol. 19, 1941, pp. 1-77.

In addition to seismic waves proper, seismograms show other types of vibration. Among the latter, the most common and articulate is the microseismic disturbance. Its nature and variation have been examined by the author with the use of observations made at stations in different parts of the world, mainly during 1923-35. The method consisted in studying a strong microseismic storm with brisk commencement, comparing microseismic disturbance with the average swell on the coast of Morocco, determining annual microseismic variation, and analyzing the influence of the sun. The data obtained are presented in tables, curves, and maps.

The evidence shows that the average annual variation of the microseismic disturbance parallels that of cyclones and has a periodicity of 11 and 27 days, corresponding to the periodicity of sun spots. The mechanical cause of microseismic disturbance in Europe, apparently, is located in the central zone of atmospheric depressions. - V. S.

8519. Bodle, R. R. United States Earthquakes 1943. U. S. Coast and Geodet. Surv., Washington, D. C., No. 672, 1945, 49 pp.

A summary is given of earthquake activity in the United States and its possessions during 1943. It covers noninstrumental results for the various States, seismological observatory results strong motion observations, tilt data, and related information; maps and records illustrate the text. The section on strong motion presents an analysis of seismograph records, the program being carried out to obtain data for the design of earthquake-resisting structures; the material includes tracings of accelerograph records and notes on changes in the construction of strong-motion instruments. - V. S.

8520. Bucky, P. B., et al. Rock Bursts: A Symposium. Am. Inst. Min. Met. Eng., New York, N. Y., Tech. Pub. 1468, 1942, 56 pp.

A symposium on rockburst is presented by authors from different parts of the world. It deals with the nature, causes, prevention, prediction, and control of this phenomenon. Some 60 statements are assembled covering theory. methodology, practice, criticism, etc. They are regarded timely in view of recent evidence challenging some of the basic conceptions of rockburst, particularly those concerning the role of depth. - V. S.

8521. Bullen, K. E. Features of the Travel-Time Curves of Seismic Rays. Mon. Notes, Roy. Astr. Soc., London, Geophys. Suppl., vol. 5, No. 4, 1945, pp. 91-98.

A method is given of deriving the main features of the seismological travel-time tables from various assumed forms of the ray velocity variation. Attention is drawn to the utility of the functions $d\Delta/dp$ and   in this connection. Attention is also drawn to the utility of the approximate formula $v = ar^b$, which is both simple in application and gives very accurate results in parts of the earth's interior, notably the region between the crustal layers and the level reached by rays for which $\Delta = 20°$. - Author's abs.

8522. Carder, D. S. Seismic Investigations in the Boulder Dam Area, 1940-44, and the Influence of Reservoir Loading on Local Earthquake Activity. Bull. Seism. Soc. America, Berkeley, Calif., vol. 35, No. 4, 1946, pp. 175-194.

Since the reservoir behind Boulder Dam started to fill in 1935, several
ndred small earthquakes have been felt in the adjacent area, and several
ousand have been recorded since the first seismograph was installed at
ulder City early in 1938. Epicenters of several hundred of the latter
ve been located, in large part along known or suspected faults on the
uthern margins of the large lower basin in the reservoir. It is believed
at the crustal block upon which this section of the reservoir rests has
en tilted downward several inches along these faults, and that the granitic
ssif south of the faults has not partaken in the downward movement. It is
own that settlement of areas of sedimentary and volcanic rocks near the
ke is somewhat greater than in similar areas of granitic rock. It is be-
eved that this settlement is the cause of large numbers of the local
ocks, partly because the peak occurrence-distribution is usually associ-
ed with peak seasonal loads in the reservoir. - Author's abs., Trans. Am.
ophys. Union, vol. 26, No. 2, 1945, p. 203.

23. Choate, B. M., and Clifford, O. C., Jr. Seismic Surveys of Neale Field, Beauregard Parish, Louisiana (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98.

Reflection-seismic exploration of an area in Beauregard Parish, Loui-
ana, was initiated in February 1938, and was first completed in October
38. As a result of shallow structural determination, a test well (dry)
s bored. This test was followed by additional seismic work, which showed
e position of the structure shifted with depth and resulted in the com-
etion of the discovery well in March 1940. Additional seismic data were
ded at various times, and the area of probable structural closure, to
pths in excess of 11,000 feet, was eventually considered evaluated by the
ethod in October 1944. - Author's abs.

524. Christie, N. J. Seismograph Exploration in England, 1944 and 1945. Mines Mag., Denver, Colo., vol. 36, No. 1, 1946, pp. 27-30.

A seismograph party of the United Geophysical Co. prospected for oil
England during 1943-45. The work was done in the area of the recently
iscovered Eakring field, Nottingham, east of the Pennine Range. The local
eds of the Milstone Grit series yielding the oil are fairly large and suit-
ble for seismic exploration. They had been explored by the Anglo-Iranian
il Co. in 1937-38, and the American crew employed reflection shooting for
etailed work.

Single ender-spreads of about 1,000 to 2,000 feet were used to cover
e area, and computations were generally made on end traces. In eastern
orkshire, every trace had to be computed because of the deep peat ground;
hough the geophones were buried, the poor quality of reflections did not
mprove. In all, the character of records was found to change considerably
ver short distances and different depths. The American crew also made well-
elocity surveys, the first in England, to check discrepancies with local
ogs and establish a velocity gradient for the area. The results of the sur-
eys in the different districts are described. They point to several prom-
sing structures. - V. S.

8525. Finch, R. H. On the Depth of Foci of Earthquakes on the Island of Hawaii. Volcano Letter, University of Hawaii, Hawaii National Park, No. 490, 1945, pp. 1-2.

Seismic observations have shown that the depth of earthquake foci on the island of Hawaii ranges from near surface to 30 miles. The shocks originate in three principal types of fault systems; namely, the fundamental rift of the island, comparatively superficial faults within the volcanic structures, and volcanic conduits. The shallow shocks along the Mauna Loa and Kilauea rifts may have foci above sea level, and their wave path may lie partly in dry, partly in water-saturated ground; as the velocity of waves is less in saturated than in dry rock, the impression of a discontinuity is then produced at the ground-water level. The deep and strong shock of December 27, 1944, which dismantled all the seismographs on the island, occurred about 20 miles below the eastern slope of Mauna Loa; it was felt 200 miles away and had at least 10 or 12 aftershocks. Other earthquakes are mentioned, and the related fault systems are discussed. - V. S.

8526. Frank, A. J. The Earthquake of March 27, 1945, on the Moselle (Missouri) Fault. Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 3, 1945, pp. 347-351.

The study of the earthquake centering near Moselle, Missouri, opens up for research a heretofore unnoticed region of seismic activity. The macroseismic data of this earthquake, summarized in the form of an isoseismal map, agree with the interpretation of the seismograms. A geologic survey made in the epicentral region delineates the fault along which both the instrumental and macroseismic results placed the epicenter. A study of the hypocentral depth shows that this fault system might extend to a depth where some have denied faulting. Thus, the earthquake gives a hint of structure. - Author's abs.

8527. Gardner, L. W. Vertical Velocities From Reflection Shooting (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98.

A method of determining vertical velocities from reflection shooting is described. A special array of spreads is used, by means of which (1) surface correlations are canceled or minimized and (2) common center points for pairs of long and short setups are used to minimize errors in the determination of angularity corrections. Examples are given in which velocities determined by this method are compared with those obtained from well shooting. - Author's abs.

8528. Gutenberg, B., and Richter, C. F. Earthquake Study in Souther California, 1944. Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 2, 1945, pp. 313-314.

Additional observations and results of calculations are given in ampli-
ication of the 16 seismological studies of earthquakes in Southern Califor-
a published in 1943-45 by B. Gutenberg, C. F. Richter, S. W. Dana, C. Y.
, and J. M. Nordquist. (See Geoph. Abs. 112-123, 1943-45.) - V. S.

529. Hayes, R. C. Earthquakes in New Zealand During the Year 1944. New Zealand Jour. Sci. Techn., Wellington, N. Z., vol. 27B, No. 1, 1945, pp. 33-35.

Maps are presented showing the epicenters of the principal earthquakes
 the New Zealand region during 1944 and the approximate isoseismals of
o of the strongest shocks. The date, time, and maximal felt intensity of
e mapped earthquakes are tabulated, and the accuracies of epicentre deter-
ination are indicated on the map. - V. S.

530. Ivanhoe, L. F. Geophysical Crews Lick the Jungles. Oil Weekly, Houston, Tex., vol. 121, No. 1, 1946, Internat. Sec., pp. 20-22.

The Seismograph Service of Delaware is carrying on extensive geophysi-
al exploration for oil in South America. Twelve parties have worked re-
ently in Venezuela. The author reports on the conditions encountered by
hem in the virgin jungle. The chief difficulties arise from a lack of
ransportation, which forces the crews to be self-sufficient. They must
uild roads, feed and shelter personnel, provide medical attention, decide
egal questions, haul and store supplies and gasoline, pay laborers in
ash, repair electric installations and trucks, etc., in order to carry on
urveying, shooting, computing, and drilling. The accommodations of a
ent camp in the jungle are described. - V. S.

531. Kreis, Alfred. Seismische Sondierungen auf dem Morteratschgletscher (Seismic Surveys on the Morteratsch Glacier). Verh. Schweizerischen Naturf. Ges., Geneva, 1944, p. 95.

The Glacier Commission of the Swiss Society of Natural Sciences
S.N.G.) resumed in 1943 its seismic measurements of glacier thickness in-
errupted by the war. A survey was made of the Morteratsch glacier, which
ffers several glaciological problems. Three stations were occupied. The
irst, on moraine debris 150 m. below the glacier, gave a P-wave velocity
f 1,600 m./sec. in the 10-meter thickness of the fluvioglacial deposits of
he glacier measured by seismic refraction; in the rock beneath, the velocity
as 4,300 m./sec. The second station, on the lower part on the glacier,
ave a P-velocity of 3,650 m./sec. in the 70-100 meter thickness of the ice
easured by seismic reflection. Finally, the third station, on the upper
art of the glacier, showed the greatest thickness of the ice to be 360 m.,
ith deep rock close beneath it. Limited time handicapped exploration from
his station. - V. S.

8532. Lees, G. M. Oilfields in Great Britain. Nature, London, vol. 155, No. 3941, 1945, pp. 567-568.

The article stresses the part played by geophysics, particularly the seismic reflection method, in locating further oil supplies. - Dominion Observatory, Ottawa, Bibliography of Seismology, No. 18, 1945, p. 302.

8533. Macelwane, J. B. Progress Report of the Jesuit Seismological Association for 1944. Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 2, 1945, pp. 315-316.

Epicentral locations, focal depths, and related information are presented for 48 earthquakes of the year 1944. The determinations are based upon the seismic observations of Jesuit and cooperating stations. Thirteen of the earthquakes, all in the Pacific and adjacent areas, were deeper than normal. One shock near the Kermadec Islands had a focal depth of the order of 600 km. The total material for 1944 is published in the Preliminary Bulletins on Epicenters, issued by the Central Jesuit Station in Saint Louis, Mo. - V. S.

8534. Martin, R. Oscilacion de suelos no elasticos (Oscillation of Unelastic Soils). Bol. Inform. Petrol., Buenos Aires, vol. 22, No. 254, 1945, pp. 256-259.

The propagation of longitudinal and transverse waves in the ground is discussed in its dependence on the elastic constants of the layers traversed; the effects of the elasticity of materials upon the extinction of vibrations are expressed mathematically. The various types of heterogeneous and unelastic ground complicate the problem. When they are reached by seismic waves propagated from elastic layers, they react as centers of new vibrations and loci of secondary epicenters, so that the total ground is subjected to various waves from numerous epicenters. This phenomenon has been recognized theoretically but has not been demonstrated. The author describes and discusses seismic data obtained in 1942 in the province of Mendoza, which show unquestionable evidence of the different types of vibrations in question. Samples of seismograms are reproduced. - V. S.

8535. Matthews, T. H. An Elementary Proof of a Theorem in Geophysics. Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 39, No. 3, 1945, pp. 21-23.

A mathematical demonstration is given showing that, in cases when velocity of propagation increases linearly with depth, the quickest wave path between two points on a surface is the arc of a circle in a vertical plane through these points. In two dimensions, the wave front of a disturbance starting at a given point is a circle of the orthogonal system, which has for its radical axis a fixed line through the center of the circle. In three dimensions, the wave front is a sphere belonging to a coaxial system.

is obtained in the latter case by rotating the circle about an axis drawn tween the point and its image in the fixed line through the center of the rcle. - V. S.

36. McCarver, H. C., and West, L. G. Geology and Geophysics of the Odem Oil Field, San Patricio County, Texas (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 97.

This paper discusses the successive steps in geological and geophysical ploration that led to the discovery of the Odem field. The original seis- graph maps are presented, showing the discovery of structure in an area parently condemned by dry holes. The remarkably close relationship of ismograph structure to areas subsequently proven productive is illustrated. geological structure map is presented; also a cross section comparing ismic and well data. - Authors' abs.

Modriniak, N. Geophysical Investigations and Drilling Results East of Karapiro Dam. New Zealand Jour. Sci. Tech., Wellington, vol. 27, No. 3, 1945, pp. 218-223 (see abs. 8509 in this issue).

537. Neumann, F. Progress Report on Seismological Activity of the United States Coast and Geodetic Survey, 1944-45. Trans. Am. Geophys. Union, Washington, D. C., vol. 26, No. 3, 1945, pp. 441-443.

The U. S. Coast and Geodetic Survey carried out its seismological pro- ram for 1944-45 without serious interruption. (1) Teleseismic work in- luded publication of results for 24 stations, instrumental activities, ests of sites for stations, a special investigation of Lake Mead-area earth- uakes, etc. (2) Information service on earthquakes in the western mountain egion and on the Pacific coast was maintained. (3) Strong-motion registra- ion continued, mostly on the Pacific coast; the application of torsion- endulum analysis to accelerograph records received considerable attention n connection with earthquake-resistant structures. (4) Vibration work was onducted at Grand Coulee dam and Ross dam to investigate the effects of alling water and tunnel blasting, respectively. (5) Instruments were con- tructed, tested, improved, special projects executed, investigations con- inued, and publications issued. - V. S.

538. Neumann, L. J. Multiple Refraction Shooting in Southern Florida (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98-101.

In the multiple-refraction method, the first arrivals of energy of sev- ral refracted events are recorded on a single oscillogram. Each of the re- racted events usually possesses enough character to enable the interpreter o correlate these events for many miles in southern Florida. The subsurface can be profiled continuously. Such refracted events were recorded from several limestones and the crystalline dolomite. This procedure enables one to determine the velocities, depths, intervals, and dips of these geological horizons. The use of n-th order refractions would enable one to determine velocities and dips, but not accurately to determine the depths and intervals. Velocities of the formations down to 2,000 feet or more are very variable in southern Florida. This precludes the possibility of using the ordinary reflection method with any great accuracy, even though reflections may be recorded. - Author's abs.

8539. Oil Weekly. A Seismograph Crew on the Mississippi. Houston, Tex., vol. 121, No. 1, 1946, pp. 18-21.

Seismograph crews working on isolated coastal areas of the Gulf of Mexico will have their living quarters on a houseboat now anchored at the mouth of the Mississippi River. The boat has been constructed by the Gulf Research & Development Co. and houses 40 persons. The technical equipment and living accommodations are described. - V. S.

Omer, G. C., Jr. Seismic Areas and Secular Magnetic Variations. Bull. Seism. Soc. America, Berkeley, Calif., vol. 36, No. 1, 1946, pp. 21-29. (See abs. 8513 in this issue.)

8540. Rosenzweig, Alfredo. Bibliografia sismologica del Peru (Seismological Bibliography of Peru). Instituto Geologico del Peru, Lima, Bol. 2, 1945, 26 pp.

This bibliography contains 223 entries covering the period 1582-1944. It is published in Spanish, English, German, and French. - V. S

8541. Robertson, Florence. On the Problem of Ground Motion. Bull. Seism. Soc. America, Berkeley, Calif., vol. 36, No. 1, 1946, pp. 17-20.

The difficulty of determining the motion of the earth from a seismogram is that the axis of oscillation of the seismogram-trace is unknown. Galitzin has assumed in his equation for an electromagnetic seismograph that the trace-amplitudes are read in the general case with respect to some arbitrary time axis expressed mathematically. The error of this approximation is cumulative because of the threefold integration employed.

The author derives a new equation for earth displacement from the Galitzin formula by making simplifying assumptions. Her calculations show that the displacement is proportional to the trace-amplitudes of the seismogram. Accordingly, for simple harmonic motion the graph of the earth displacement becomes the graph of the seismogram trace multiplied by the amplitude-proportionality factor and displaced parallel to the time axis by the amount required by the phase angle. This equation has been shown to be roximately valid for the pseudoharmonic motion of microseisms recorded the Florissant Galitzin-Wilip seismograph. - V. S.

2. Scott, H. H. An Analyzer for Sub-Audible Frequencies. Jour. Acoust. Soc. America, Lancaster, Pa., vol. 13, No. 4, 1942, pp. 360-362.

A report on this useful tool is given in General Radio Experimenter, . 20, Nos. 6-7, pp. 3-7, Cambridge, Mass., Nov.-Dec., 1945. The list ce of the instrument is quoted at $275. The frequency range covered is to 750 cps. - Dominion Observatory, Ottawa, Bibliography of Seismology, 18, 1945, p. 310.

3. Seismograph Service Corporation of Delaware. South American Oil Zones, pt. 2. Petroleo Interamericano, Tulsa, Okla., vol. 2, No. 5, 1945, pp. 87-98.

The chief deterrent to South American prospecting for oil is unfavor- e local geology. Great thicknesses of continental deposits cover much of e area and render ill-accessible many structures that might produce from e later Mesozoic and Tertiary formations. Below them is the Gondwana ries of thick glacial deposits concealing the Paleozoic possibilities. refore, oil discovery depends largely on the deep-sounding geophysical thods.

To further such exploration, the depositions of the major sedimentary stems of Central and South America are discussed and illustrated by geo- gical maps. Consideration is given to Devonian, Permo-Carboniferous, sozoic, Eocene-Oligocene, and Miocene-Pliocene sediments as contained in e Brazilian-Guiana shield, Gondwanaland, Circum-Gondwana, the Andes, Inter- dean embayments, and the coastal plain. The areas favorable for oil and s prospecting are indicated and shown on the maps. (For Part 1, see oph. Abs. 120, No. 7844.) - V. S.

44. Silgado, E. F. Datos Sismologicos del Peru (Seismological Data of Peru). Instituto Geologico del Peru, Lima, Boletin No. 3, 1946, 42 pp.

The information presented covers the seismological activities of the ological Institute of Peru, statistics and maps on the earthquakes regis- red by its Geophysical Section during 1945, and a detailed description of e destructive earthquake of August 6, 1945, in Moyobamba. In all, there re 129 distinct shocks during February-December, mostly of intensity III- , Mercalli Scale 1931. - V. S.

45. Sloat, John. Is the Seismograph Still Champion? Oil Weekly, Houston, Tex., vol. 120, No. 10, 1946, pp. 17-22.

During 1945, over thirty million dollars have been expended by oil com- nies in the United States on seismograph exploration. The question as to whether the best possible use is made of this method is examined in the light of the principles of seismic exploration.

There are only two physical quantities that can be measured directly with the seismograph - surface distance and time. In order to utilize this information, it is necessary to convert travel time to underground dip and depth. This is accomplished by making assumptions on the velocity of propagation of the sound wave and computing the corresponding depth and dip of the reflected wave. However, many beds do not give consistent reflections on seismograms, so that seismograph records actually depend on velocity contrasts. Interpretation is thereby complicated because variation of velocity with different subsurface conditions renders the use of average velocity hazardous. Concrete examples are given, implications are worked out for structural and stratigraphic traps, and remedies are suggested. Cross sections and seismograms illustrate the text. - V. S.

8546. Ulrich, F. P. Progress Report of Seismological Work by the U. S. Coast and Geodetic Survey in the Western United States During 1944. Bull. Seism. Soc. America, Berkeley, Calif., vol. 36, No. 1, 1946, pp. 31-41.

The seismological work of the U. S. Coast and Geodetic Survey in the western United States during 1944 has consisted of the following activities: (1) The questionnaire program collected reports of 290 earthquakes; 25 of them, rated in intensity V or greater, are described and shown on maps. (2) The strong-motion work was carried out by means of 44 accelerographs, 6 displacement meters, 11 Weed strong-motion seismographs, 1 mechanical vibration recorder, and 3 tiltmeters. (3) Tiltmeter registration went on continuously throughout the year; the tiltgrams are shown. (4) Vibration observations were made on buildings and dams, particularly on Ross Dam, Seattle. The other activities of the Survey dealt with instruments, selection of sites for installations, publication of reports, epicentral determination, rock vibration due to blasting, and a cooperative seismological program for the western hemisphere. - V. S.

8547. Williams, F. J. Notes on Shot-Point Procedure (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 101.

Some characteristics of seismic explosives are reviewed, and an attempt is made to outline optimum shot-point procedure from the standpoint of efficiency and quality of data. Care in preparation of charges is stressed, with special emphasis on cap placement and charge assembly. The time-current relations of a specific seismic cap are given, and the effect of the resistance of the firing circuit upon detonation time is discussed. Suggestions are made in regard to the choice of the favorable location for the up-hole time seismometer. It is concluded that adherence to well-defined specific shot-point procedure is essential to the efficient procurement of highest-quality recordings. - Author's abs.

4. ELECTRICAL METHODS

548. Fisher, G. R. Geophysical Prospecting for the Layman. Fisher Research Laboratory, Palo Alto, Calif., 1946, 47 pp.

A brief outline is given of the seismic, gravitational, magnetic, and adioactive methods of geophysical exploration. Attention is then devoted o the electrical methods of natural earth potential, applied current (parallel wire, polar electrode, leap frog, earth resistivity), and induced urrent (parallel wire, horizontal loop, vertical loop). The different actors affecting electrical methods, such as the characteristics of the onductors, conducting body, and surrounding formations, are considered. s an example of inductive exploration for metals, prospecting with the etallascope is described. Principles of operation, models of the apparaus, and field techniques are outlined and illustrated by drawings. - V. S.

549. Lannuzel, J., and Souchon, E. Electric Logs: How Affected by Mud Invasion into Formation. Petroleo Interamericano, Tulsa, Okla., vol. 4, No. 4, 1946, pp. 56-60

Mud invasion into a permeable formation opened by drilling decreases he spontaneous potentials measured by an electric log and can lead to rroneous interpretation. Such invasion forms several layers in the walls f a hole: Mud cake, zone contaminated by mud, and zone contaminated by ud filtrate. The filtrate zone may be removed several feet from the wall, nd usually it has a different resistivity from that of the uncontaminated ormation. Since a resistivity log measures only a short distance behind he wall, it will record the resistivity of the invaded zone. To overcome his difficulty, the devices of long-normal or lateral sounding may be emloyed. They aim to reach beyond the influence of the mud by making use of he dependence of a log's radius of investigation upon the spacing of elecrodes. The problems involved are discussed. - V. S.

550. Lewis, W. B. Let Us Look at Electrical Exploration. Oil Weekly, Houston, Tex., vol. 118, No. 11, 1945, pp. 57-58.

The propagation of electromagnetic waves through the air and the ground s compared. The ground has a greater absorptive and dispersive effect upon he waves and reduces their speed; moreover, different horizons vary in relecting capacity according to their resistivity. Inasmuch as petroleum as a high electrical resistivity, it changes the character of reflections assing from less resistive horizons and registers as an anomaly in the ecord.

These factors explain what electromagnetic waves must be used in oil xploration and how they must be used. Low-frequency waves are sent into he ground by means of a periodically reversed current passed through two rounded electrodes; the alternating potential is measured at several diferent frequencies. The effects of this current are observed in terms of he potential between two probe electrodes suitably disposed relatively to the current electrodes. The entire electrode pattern should answer the conditions of the area explored. Such a procedure is repeated at a number of stations distributed over the area. The method has proved effective, rapid, and economical. Its advantage lies in the fact that it identifies petroleum by means of its electrical properties rather than by associated structure. - V. S.

Magnée, I. de. Les méthodes d'exploration géophysiques et le laboratoire de géologie (Geophysical Methods of Exploration and the Geological Laboratory). Bull. Soc. Belge Géol., Paleont., & Hydrol., Brussels, vol. 53, No. 3, 1945, pp. 199-228. (See abs. 8507 in this issue.)

8551. Paver, G. L. The Application of the Electrical Resistivity Method of Geophysical Surveying to the Location of Underground Water, with Examples from the Middle East (abs.). Abstracts, Proc. Geol. Soc. London, Sess. 1944-45, No. 1407-15, 1945, pp. 56-61.

Geophysical surveys of underground water usually employ the electrical resistivity method. It approaches direct localization closer than other methods, requires a short time, and costs relatively little. The data gained indicate the variations of the substrata both vertically and horizontally. The method's technical problems, instruments, field practices, calculations, graphs, and interpretation are discussed. The profitableness of resistivity exploration is illustrated by examples of surveys in Egypt, Sinai, Palestine, Trans-Jordan, Syria, and Cyprus; some local problems and results are cited. - V. S.

8552. Storm, Barry. Geophysical Prospecting Methods. Min. Jour., Phoenix, Ariz., vol. 29, 1946, No. 21, pp. 3-4, No. 22, pp. 5-7.

A lone prospector for metals can no longer depend on his intuition but must adopt scientific methods. Most suitable for his purpose is the electrical method. Its principles are outlined and the techniques of surface potential, applied current, and electric induction explained.

The use of the last-named technique is further illustrated by the example of prospecting with a Fisher's radionic Metallascope. This apparatus consists of two units - a transmitter and a receiver. The transmitter establishes a primary electro-magnetic field in the earth which affects the receiver only when a conductive body is located in the subsurface nearby, within the range of the downward radiation. A secondary field of opposite polarity is then induced, which distorts or broadens the original field and thus energizes the receiver's radio-finder circuit. The differences in electrical radiation caused by the conductive body register on the receiver's milliampere dial and in an earphone.

There are several models of the M-Scope - a light portable mounting both transmitter and receiver on a single frame, and a heavier portable in which the units are used as separate instruments. The model and the field method to be employed in any particular case depend on the depth range and

gree of mineralization investigated. The "balanced," "null or minimum re-
ption," and "parallel or positive" methods are described, their applica-
ons discussed, and instructions for using a depth-triangulation chart
ven. - V. S.

553. Workman, L. E., Bays, C. A., and Buhle, M. B. The Use of Electrical Earth Resistivity Surveys in Illinois (abs.). Econ. Geol., Lancaster, Pa., vol. 40, No. 8, 1945, pp. 610-611.

For nearly 15 years the electrical earth-resistivity method has been
sed in Illinois to guide test drilling in the search for water-bearing
ands and gravels in the glacial drift. During this period, many areas in
e State have been surveyed, and many municipal and industrial water sup-
lies have been found and developed very economically as a result of this
rk.

Portable instruments are employed by the Illinois State Geological
rvey in earth resistivity work. The method utilizes a modified Gish-
oney four-electrode system with commutated direct current applied to two
eel current electrodes and a potential-drop measurement taken across two
pper "potential" electrodes. Spacing of electrodes is by the Wenner
stem and is closely related to the diameter of the hemisphere of measure-
nt. By increasing electrode spacing, measurements of resistivity to in-
reasing depths are made.

Empirical interpretation methods suitable for the geological conditions
btaining in Illinois are applied, and all available surface and subsurface
nformation is closely integrated with the resistivity data. Typically,
e method is used only for location of relatively thick sand or gravel de-
osits within 250 feet of the surface. Other applications, such as the
ocation of highway construction materials, have been made. - Authors' abs.

5. RADIOACTIVE METHODS

554. Barcklow, J. C. Better Interpretation of Neutron Curves. Oil Weekly, Houston, Tex., vol. 118, No. 12, 1945, pp. 53-55.

The most common difficulties in the interpretation of neutron curves
rise from the uncertainty of the phenomenon measured by them. Is it
elative porosity or the relative total fluid? Why are high intensities
ound sometime opposite oil staining sections? No successful tests have
een made so far to determine the answers. However, comprehensive data
ere gathered in 1945 by coring 57 feet of Hunton lime in a well of the
est Edmond pool, central Oklahoma, for comparing the neutron curve with
ore analysis.

The results are tabulated, and the significant relationships are ex-
ressed in curves. They point to the following conclusions: (1) High
ntensities occur on curves opposite limestone sections showing oil staining
ecause there is not enough total fluid to affect neutron intensity; (2)
he neutron curve generally follows the porosity curve quite closely; how-
ver, there are discrepancies when a rock is porous but almost dry; (3) the

neutron curve follows closely the average curve of relative total fluid, except at greater depths; probably, the ionization chamber does not have time to react. Certain other types of irregularities are indicated. Similar studies through sandstone would shed further light on interpretation. - V. S.

8555. Cullen, T. L. On the Exhalation of Radon from the Earth. Terr. Magn. & Atmos. Elec., Baltimore, Md., vol. 51, No. 1, 1946, p. 37-44.

Measurements were made, according to the method of Zupancic, of the rate at which the Earth exhales radon. A metal vessel was placed over a section of lawn near the Physics Building, Fordham University, and after a period of accumulation a sample of the gas was withdrawn from the vessel into an ionization-chamber and measured for radon content. The average exhalation from August 1944 to February 1945 was 8.92 x 10^{-18} curie per cm^2 per sec. The effect of temperature was studied, and it was found that a maximum exhalation was reached in hot weather and a minimum in cold weather. Snow, it was observed, choked off exhalation and produced very low values in January and February. The effect of rain is complex, heavy rains producing at first great exhalation, then lower values. A study of hourly variations was attempted, and a maximum was found for the morning period of 04^h to 12^h. - Author's abs.

8556. Hess, V. F., and Balling, Eva. A New Determination of Eve's Constant. Trans. Amer. Geophys. Union, Washington, D. C., vol. 26, No. 2, 1945, pp. 237-240.

A new determination of the value of Eve's constant that employed three ionization chambers of various sizes, having area-volume ratios of 0.249, 0.348, and 0.504, respectively, is described. Applying necessary corrections and extrapolating to zero area-volume ratio, a value of Eve's constant of 4.63 x 10^9 ion-pairs per cc. per gm. radium in air at NTP is deduced. - Authors' abs.

8557. Holmes, Arthur. An Estimate of the Age of the Earth. Nature, London, vol. 157, No. 3,995, 1946, pp. 680-684.

The age of the earth has been calculated by the author on the basis of A. O. Nier's data on isotopic abundance in lead minerals. These data rule out a post-depositional contamination of lead. The view was therefore adopted that before its concentration in ores, lead had been dispersed through various radioactive source materials in which the primary lead was slowly modified by the addition of radiogenic lead. When computed from the time when the radiogenic lead first began to accumulate in these materials, the age of the earth was found to be of the order of 3,000 million years. The theoretical foundations of such a method of calculation and the findings tained are discussed, with tabulation and plotting of results. The most robable sources of ore-lead appear to be granitic rocks. - V. S.

558. Korf, S. A. Electron and Nuclear Counters. D. Van Nostrand Co., New York, 1946, 212 pp. Price, $3.

This book summarizes the theory of various types of ionization counters easuring electromagnetic or corpuscular radiation. It deals with the internal mechanism of discharge, constructional and operational features, conentional Geiger counters, counters for special purposes, counters of neurons responding to gamma radiation, various electronic curcuits, errors ade in counting, and corrections. The text is written for users of counters d presupposes some acquaintance with atomic physics. - V. S.

559. Kuenen, P. H., and Neeb, G. A. The Geological Results of the Snellius Expedition. E. J. Brill, Leiden, 1942, 268 pp.

The two monographs composing this book deal with samples of sea-floor eposits collected during 1929-30 by the Snellius expedition to the sea etween the Sunda Shelf and the Sahue Shelf, near Borneo. The first paper iscusses methods for gathering samples, describes a new type of sampler pecially adapted for the collection of long cores from the sea-floor, and resents conclusions to be drawn from chemical composition and radioactivity egarding the conditions of deposition. The second paper gives a detailed etrographic analysis of the samples. (A review appeared in Geol. Mag., ertfort, vol. 83, No. 2, 1946, pp. 97-98). - V. S.

560. McCahon, J. F. A Portable Counting Rate Meter for G-M Tubes. New Zealand Jour. Sci. Tech., Wellington, vol. 27, No. 3, 1945, pp. 254-258.

A description is given of a portable counting rate meter and high-ension supply for Geiger-Müller tubes suitable for use in prospecting for adioactive minerals. - Author's abs.

561. Mercier, V. J. Radioactivity Logging of Dolomites. Oil Weekly, Houston, Tex., vol. 121, No. 7, 1946. pp. 36-41.

The delineation of the Arbuckle, Makoreta, and Viola dolomites, counted mong the most important oil producers of Kansas, offers considerable dificulties. Dolomite is weakly radioactive, cannot be distinguished from imestone on a radioactive curve, and registers unreliably on the neutron urve responsive to porous zones. However, indirect evidence may be gathered rom various physical changes in a well logged by the neutron curve. The ecording of these changes is discussed, its usefulness illustrated by nuerous examples of Kansas logging, and a comparison drawn with electrical ogs.

The evidence tends to support the view that the Kansas dolomites contain porous zones interspersed with dense impervious strata. It shows that more information may be gained by drilling and gun-perforating through dolomites than by using cable-tool methods. - V. S.

8562. Oddone, Emilio. Elementi per una carta delle caratteristiche radioattive del suolo Italiano (Elements of a Map of the Radioactivity Characteristics of Italian Soil). Geofis. Pura & Appl., Messina, vol. 2, No. 2, 1940 pp. 142-152.

A provisional map is prepared of the distribution of radioactive elements in the soil of Italy. It is based upon the table of Stoklasa and Penkava listing the radioactive characteristics of rocks in different geological periods. The advantages of such a map for various types of exploration are discussed. - V. S.

8563. Oil Weekly. Radioactivity Experiments Aim at Finding New Reserves. Houston, Tex., vol. 121, No. 8, 1946, p. 50.

The radioactive investigation of I. Berger, C. Sheppard, and V. Burton sheds new light on the genesis of petroleum and promises advances in oil-finding methods. In the past, high temperatures and pressures had been thought to contribute the energy converting organic matter into petroleum. More recently, bacterial action and energy from the high-speed particles released by radioactivity were deemed potent factors. However, research by the Geology Department of the Massachusetts Institute of Technology shows that there may be enough radioactivity in the organic materials themselves to effect the conversion over a period of 10 to 100 million years. Certain fatty acids isolated from ocean-bottom muds and exposed to laboratory bombardment by alpha particles from radioactive disintegration were converted into straight chain and cyclic hydrocarbons which make up the greater proportion of natural petroleum. Work is now in progress on complex organic substances and the measuremtnt of radioactivity in earth materials. - V. S.

8564. Roberts, J. E. Spectrum of Radium (B + C) Gamma Rays. Philos. Mag., London, vol. 36, No. 255, 1945, pp. 264-269.

Using the experimental results of Skobelzyn and of Ellis and Aston, the energy distribution in the gamma-ray spectrum of radium (B + C) with varying degrees of filtration has been calculated. From the energy distributions, the scattering absorption coefficients of the heterogeneous radiations have been computed and compared with recent measurements made by the author of absorption in aluminium and carbon. - Author's abs.

8565. Rothé, E. Concentration of Radioactivity. Compt. rend. Acad. Sci. Paris, vol. 211, 1940, pp. 753-756.

A number of observed natural accumulations of Ra and Th are described. he most striking are in clay nodules in a Permian rhyolite quarry in the aint-Dié district, and in parts of a granite formation in the Puy-de-Dôme rea. - L. J. J., British Abstracts, London, March 1946, A-1, p. 103.

6. GEOTHERMAL METHODS

3566. Mine and Quarry Engineering. Rock Temperatures. Maidenhead, Berkshire, vol. 10, No. 9, 1945, pp. 209-210.

The parallel investigations of rock temperature conducted on the Witatersrand, South Africa, by R. A. H. Flugge de-Smidt and Oscar Weiss are utlined. They purported to determine the temperatures to be encountered n mining operations to depths of 9,000 feet. To obtain mutually checking esults, the investigators worked independently and used different methods; linical thermometers served in the first survey, and electrical resistance hermometers in the second. The conclusions reached for a depth of 8,000 eet were, respectively, 103° and 101.3° F. Such close agreement attests he precision of the methods.

Flugge de-Smidt lowered into a borehole a frame of treated hardwood aving the length of the hole and carrying a series of thermometers inserted n recesses 4 feet apart. A simultaneous record was thus obtained through he entire depth investigated. Before use, the thermometers and the frame ere kept frozen; in their recesses, the thermometers were packed with rushed ice. The frame remained in the borehole for 48 hours. Special preautions were also taken upon withdrawal to eliminate the effects of outside emperature.

Weiss took the view that the framework should be made of thin-walled etal tubes with heat-insulating joints and be maintained at the expected rock temperature. Other differences existed between the two investigators, out in their totality they contributed substantially to knowledge of thermal conditions and measurements at great depth. - V. S.

3567. ulianoff, Nicolas. Mesures géothermiques dans les puits de forage (Geothermal Measurements in Boreholes). Verh. Schweiz. Naturforsch. Ges., Geneva, 1941, pp. 101-102.

Geothermal measurements were made in two boreholes near Lausanne and Yverdon, Switzerland, during the boring. Maximum thermometers were used. A preliminary report is given on the investigation. - V. S.

7. GEOCHEMICAL METHODS

3568. Brewer, A. K. The Mass Spectrometer as an Analytical Tool. Min. & Metal., New York, vol. 27, No. 472, 1946, pp. 207-209.

A new tool of atomic analysis has been introduced into chemical laboratories - the mass spectrometer. It separates atoms and mass groups by utilizing their momentum, instead of solubility and chemical properties, and requires very little time and material. So far, the spectrometer is applicable only to gases and hydrocarbon vapor, but this handicap is being overcome.

The method of analyzing soil for natural oil and gas, developed by H. Hoover, Jr., and H. W. Washburn, consists in bombarding hydrocarbon molecules by electrons of an energy of 50 to 100 volts, sufficient to form positive ions. Such bombardment breaks the molecules down into fragments having always the same mass and relative abundance in individual compounds but never in different compounds; the steps of the precedure are described. The results of the analyses register photographically as a series of peaks, depending upon the chemical nature of the sample. It takes only 10 to 30 minutes to run a sample through the instrument but 1 to 20 hours to calculate the composition of the material. Precision ranges from a few tenths to a few thousands of 1 percent.

At present, spectrometer analysis serves primarily for the detection and measurement of isotopes; the different lines of investigation in this field are described. Other applications appear likely in the near future.- V. S.

8569. DeMent, Jack. Fluorochemistry in Petroleum Science. Ultraviolet Products Co., Los Angeles, Facts about Mineralight, Bull. 2, 1944, 4 pp.

L. W. Blau has developed a method of exploring petroleum deposits by gauging their fluorescence effects on the surface. Oil accumulations give off hydrocarbon gases, which diffuse upward and produce in the surface soil conditions attracting certain bacteria, such as bacillus methanicus and bacillus ethanicus. These bacteria multiply and change the gases into fluorescent substances that respond to ultraviolet light by glowing.

In a survey, soil samples free from plant admixture are collected on the surface and at uniform depths within several inches. They are further examined under an ultraviolet lamp and graded as to degree of fluorescence by comparisons with assorted fluorescence standards of known intensity. The results, plotted on a map, serve as a guide for more detailed exploration. - V. S.

8570. Dzens-Litovsky, A. I. Natural Gases in Bottom Deposits of Mineral Lakes. Compt. rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 48, No. 7, 1945, pp. 491-493.

Surveys of mineral lakes in south Russia, western Siberia, and central Asia have shown that their bottom silts and chemical sediments usually contain gases throughout their thickness. In the course of drilling, the brine was observed to bubble with liberated gases, particularly in the mineral lakes in deserts which had the highest gas saturation.

The major part of the gases is hydrocarbons, mostly methane mixed with nitrogen. They are rich in light combustible constituents mixed with hydrogen sulphide. One lake in the Crimea contained almost pure methane, which burned for several hours. The various microbiological and chemical ocesses producing the gases and the migration and accumulation of gas are scussed. It is concluded that the origin and formation of natural gases the fossil salts of mineral lakes should be sought in recent bottom positions. - V. S.

71. Gabriel, V. G. Present Status of Geochemical Prospecting. Oil Weekly, Houston, Tex., vol. 118, No. 10, 1945, pp. 50-53

Geochemical prospecting is traced from its inception in the research Munn and Rich three decades ago, through its development in the investi- tions of Hassler, Laubmeyer, and Sokolov, to its culmination in the field rk of Rosaire, Horovitz, McDermott, and Pirson.

The field methods of soil analysis used by Rosaire, Horovits, and Dermott aim at determining gaseous, liquid, and solid hydrocarbons and rtain inorganic substances in the soil. Oil possibilities are judged by e presence, concentration, and distribution of significant constituents. e chief difficulties lie in the uncertainties of the upward migration of l and gas and the incompleteness of regional geochemical data. The geo- namic method of Pirson analyses the undisturbed rate of hydrocarbon-gas ffusion through the area investigated with a view to determining the pos- ble existence and approximate depth of oil accumulations.

The results of different geochemical surveys made during 1936-42 and ported in the literature are tabulated. They show that very few oil elds were found, but that the already discovered pools were delineated d expanded successfully. Further advances are expected to lead to a eater precision of geochemical exploration. The paper is supplied with bibliography. - V. S.

72. Pirson, S. J. Disturbing Factors in Geochemical Prospecting. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 312-320.

A review of the results of over 3,000 measurements of soil ethane anation-rate made over the past 5 years has revealed a number of conclusions ich have an important bearing upon the validity of geochemical methods of ospecting for oil and gas wells. A number of factors have been found to highly disturbing, namely, earth topography, ground-water percolation and epage, barometric-pressure variations, etc. These effects result in fluc- ations of the rate of escape of hydrocarbon accompanied by horizontal ifts of leakage, which gives rise to the creation of artificial leakage ghs altogether meaningless from the point of view of oil and gas accumu- tion at depth. Certain qualitative rules of interpretation have been tablished, which permit weeding out of the meaningless anomalies provided ough information is at hand on the topography and watertable movement.

A further observation has been made indicating that the artificial omalies are often of greater magnitude than the significant measurements. nce, the problem, so common in other geophysical methods, of making im- rtant reductions on the observed figures is imperiously facing the ex- oration geochemist if he is to develop a valuable prospecting tool. A rious attempt is presently made to solve this problem. - Author's abs.

8573. ZoBell, C. E. Studies on Redox Potential of Marine Sediments. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 4, 1946, pp. 477-513.

Redox potential is defined as the electron-escaping tendency of a reversible oxidation-reduction system. It expresses quantitatively the reducing intensity of such a system and can be measured in volts, as an electromotive force referred to a standard hydrogen half-cell. This intensity apparently has a pronounced effect upon the diagenesis of sediments, including the conversion of organic matter into petroleum. Methods of measuring the potential and related values in sedimentary materials are described and discussed.

The data gathered on more than 1,000 samples of bottom deposits show that each type of sediment has its own redox characteristics. In recent sediments, values range between +.35 and -.50 volts. As a general rule, the potential decreases with core depth, indicating that conditions become more alkaline. Positive values are usually typical of bottom deposits poor in organic matter; negative values, of deposits rich in organic matter. Some other findings are outlined. - V. S.

8. GENERAL AND UNCLASSIFIED GEOPHYSICAL SUBJECTS

8574. American Geophysical Union. Education in Geophysics. Transactions, Washington, D. C., vol. 26, No. 3, 1945, pp. 463-476.

A comprehensive tabulation is presented of courses in geophysics offered in American colleges and universities. The information was collected in 1945 by means of a questionnaire distributed in response to the War Manpower Commission program of assistance to returning servicemen and women. The geophysical branches listed in the questionnaire included seismology, geodesy, terrestrial magnetism and electricity, tectonophysics, volcanology, and geophysical exploration. The table gives the various courses taught in these sciences in 108 educational institutions in 44 States in the United States; not all the answers were included. The total material indicates that only a few schools now have Departments of Geophysics. However, there are good opportunities to integrate from the established curricula a course for a Bachelor of Geophysics degree. Generally, students can readily select courses suitable to preparation for a geophysical career. - V. S.

8575. American Geophysical Union. Canadian Committee on Geophysics. Trans., Washington, D. C., vol. 27, No. 2, 1946, p. 298.

A Committee on Geophysics has recently been established as an associate committee of the National Research Council of Canada. Membership includes geophysicists from Federal and Provincial departments and the universities. There are six subcommittees. Widespread interest is manifested not only in geophysical prospecting but also in long-term geophysical studies. - Abridged by V. S.

76. Anderson, J. F. Trends in Geophysical Exploration. World Petrol., New York, vol. 17, No. 3, 1946, p. 43.

The wartime search for oil has brought to geophysical methods gen-
al recognition and a closer integration with geology. Definite trends
re also observable in the use of different methods, organization of ex-
oration, and related research.

The seismic method has scored the greatest gains and is being adopted
l large and small oil companies. It is now regarded as a necessary part of
ery exploration program, especially for low-relief structures, strati-
aphic features, flanking of salt domes, marshes and swamps, inland and
astal tidewaters, and special problems. To improve interpretation, a
rty manager often makes a daily reading of field data in the district
adquarters of a survey, where he can have fuller geological information
his disposal. Still other developments in seismic exploration are in-
cated.

General geophysical research tends to concentrate on improving existing
thods, instruments, and equipment rather than on searching for new prin-
ples of exploration. The geophysical-service companies have multiplied
reefold during the last four years. - V. S.

77. Boots, P. H., and McKee, A. H. Geophysical Operations in Kuwait. Geophysics, Menasha, Wis., vol. 11, No. 2, 1946, p. 164-177.

This paper describes the general operations of the combined geophys-
cal party, using gravity, magnetic, and seismic methods, which made a sur-
y of Kuwait in one working season. The organization of the party, the
neral conditions met, and the manner in which the operations were adapted
the country and its people are outlined. The geophysical results them-
lves are not included, but it may be remarked that the surveys described
d to the discovery of one of the great oil fields of the world. - Authors'
os.

578. Coffin, R. C. Recent Trends in Geological - Geophysical Exploration and Methods of Improving the Use of Geophysical Data (abs.). Oil and Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 91.

Since 1942, the use of gravimetric methods has increased in the United
tates approximately 200 percent, seismic methods 60 percent, core drilling
00 percent, and the magnetic investigations 70 percent. The impact upon
eological thinking because of this continued increase of geophysical effort
s discussed. Full advantage offered by these methods and combinations of
ethods is not being made. A better use of the low-cost methods is pointed
ut. Tremendous increase in the use of the gravity method has not been made
ith corresponding improvement in the proper understanding of its possible
se and its limitations. The use of the gravity method is discussed in some
etail. A tremendous improvement in our geological thinking and a better
se of geophysical data are possible by an education of district or "grass
oot" geologists in geophysical concepts and a freer use of this information.

A trend in this direction is noted, but the need of an accelerated move in this trend is emphasized. - Author's abs.

8579. Deegan, C. J. Large Exploration Campaign Under Way in Canada. Oil & Gas Jour., Tulsa., Okla., vol. 44, No. 34, 1946, pp. 274-275.

In Canada, exploration for oil is gaining momentum. American, British, and Canadian interests conduct operations, particularly in the Rocky Mountain foothills of Alberta and the plains of the east. The work is carried out by seismic, gravimetric, and geological methods and by test drilling. A cooperative aerial photo-survey financed by six groups has been made in the Alberta hills. - V. S.

Fisher, G. R. Geophysical Prospecting for the Layman. Fisher Research Laboratory, Palo Alto, Calif., 1946, 47 p. (See abs. 8548 in this issue.)

8580. Gallet, E. S. Estudios y explorationes petroliferas effectuados en Magallanes e Isla Grande de Tierra del Fuego (Petroleum Studies and Surveys in the Magallanes and the Isla Grande de Tierra del Fuego). Bol. Minero, Santiago de Chile, No. 549, 1946, pp. 6-8.

The Corporation de Fomento de la Produccion, Chile, has investigated petroleum possibilities in the province of Magallanes and the Isla Grande de Tierra del Fuego. The work included stratigraphic studies and geophysical exploration. Preliminary geological reconnaissance reduced an originally promising area of 30,000 km.^{2} to 1,000 km.^{2} for detailed surveys. Favorable stratigraphic indications were then found in the sandstone conglomerate "Remarcable" on Isla Englefield; the local geology is described. Geophysical findings localized structures on Isla Grande de Tierra del Fuego; they are discussed. It is proposed to continue exploration to determine whether the oil is available in commercial quantity. - V. S.

8581. Geophysics. The Job of the Geophysicist. Menasha, Wis., vol. 11, No. 2, 1946, pp. 221-224.

Answers are given to questions concerning the work of geophysicists, such as: What do geophysicists do, where do they work, what do they earn, what is the outlook, where to prepare for a geophysicist's career, what subjects must be studied, what jobs are related to geophysics, etc. The information is furnished to assist persons in choosing an occupation, particularly college students and servicemen. It is essentially a reprinting of Occupational Brief No. 26, dated Sept. 1, 1945, prepared by the National Roster of Scientific and Specialized Personnel of the War Manpower Commission for use in the education programs of the Armed Services. - V. S.

62. Heiland, C. A. Geophysics. Min. & Metal., New York, vol. 27, No. 471, 1946, pp. 109-114.

'Geophysical exploration in the United States and abroad during the year 5 is reviewed. Noteworthy technical developments are indicated, and con- ibutions to the war effort are outlined.

1. Oil and Metals Exploration in the United States. (a) Oil: The tal outlay of the petroleum industry for geophysical work was about $55,- 0,000, divided as follows: Seismograph, $39,000,000; gravimeter, $9,000,- 0; magnetometer, et al., $1,000,000; and electrical well-logging, $6,000,- 0. The estimated percentage of well-completions logged electrically anted continuously through the last five years: 1941, 37 percent; 1942, percent; 1943, 57 percent; 1944, 64 percent; 1945, 74 percent. Worthy particular note are surveys in the eastern Gulf and Seaboard States, ismic and gravimetric work in the Rocky Mountain States extending into berta, Saskatchewan and farther northward, and exploration on Cape Simpson, aska. (b) Metals: Strategic metals were sought in various States by the reau of Mines and private consulting firms. The Bureau made magnetic sur- ys for iron in New York, Virginia, and Utah, for magnetite in North Caro- na and Tennessee, and for manganese in Massachusetts and New Mexico; ectrical surveys for copper in Vermont, Nevada, and Arizona; and surveys r copper in Virginia and New Mexico, lead in Kansas and Oklahoma, and lead d zinc in Virginia. The E. F. Kelly Geophysical Services Co. surveyed uorite in Illinois, syenite in Arkansas, and lead in Missouri; the latter posits were also explored by the Bureau of Mines and the Geophysical Ex- oration Co.

2. Oil and Metals Exploration in Foreign Countries. (a) Oil was ught mostly in the Caribbean area and South America; exploration increased arly 50 percent over 1944, averaging about 60 seismic, 30 gravimetric, and me geochemical and magnetometer parties. In Venezuela and Colombia, sur- ys by different oil companies continued or increased. Various geophysical thods were used in Cuba, Trinidad, Ecuador, the Dominican Republic, Bra- l, Argentina, Paraguay, and Chile. There was also exploration in Saudi abia, Egypt, France, and England. In Russia, 30 seismic and 25 electrical rties worked in the "Second Baku" region; discoveries were made in the zran and Saratov areas. (b) Exploration for metals continued intensively Canada. The Lundberg Co. reports magnetic, resistivity, radiograph, ectromagnetic, and spontaneous polarization surveys in 52 mining properties. e consulting firm of Koulomzine, et al, made 41 surveys, mostly magnetic. her firms likewise made surveys.

3. Technical Advances: Many gains were made in geophysical methods d in related fields. As far as information is available, no revolution- ing discoveries occurred. (a) Exploration techniques benefited particu- arly by improvements in gravimeters and magnetometers for submerged areas. ismic methods of refraction with continuous profiling and "arc" mapping re revived. Fluorographic, surface-temperature, and electrolytic-model chniques received further attention. (b) Advances in related fields oc- rred both through the strategic projects involving prospecting techniques d through affiliated research conducted by geophysicists for the armed rces. The strategic projects included, in addition to exploration for oil

and minerals, aerial magnetic mapping, land-mine detection, and salvage. Airborne magnetometers served for mapping oil structures in Oklahoma and Alaska and iron deposits in Michigan and the Adirondacks. Stretegic research covered radar, proximity-fuse, atomic-bomb, magnetic mine countermeasures, sonar, sound-ranging, acoustic-bomb, and aircraft testing. (Summaries of this review appeared in Oil & Gas Jour., vol. 44, No. 43, 1946, pp. 58-59; World Petrol., vol. 17, No. 3, 1946, pp. 52-53; and Min. Jour., London, vol. 226, No. 5769, p. 209.) - V. S.

8583. The Independent PAA Monthly. Exploration Associations Hold Meeting. Tulsa, Okla., vol. 17, No. 1, 1946, p. 18.

The Society of Exploration Geophysicists (SEG) held its first post-war annual metting jointly with the geologists' AAPG and the paleomineralogists' SEPM, in Chicago. At the SEG technical sessions numerous papers on instruments, practical applications, and general principles were read. Much interest was aroused by S. J. Pirson's report on geochemistry and E. Frowe's account of a diving bell for gravimeter operations. (See also Oil & Gas Jour., vol. 44, No. 48, 1946, pp. 83-84). - V. S.

8584. Kelly, S. F. Geophysicists Suggest More Joint Meetings in the Future. Min. & Metal., New York, vol. 27, No. 472, 1946, pp. 224-225.

At the A.I.M.E. annual meeting of 1945 in Chicago, the joint session of the committees on geophysics and on mining geology heard papers on the general progress of geophysics, interpretation of magnetic observations, radioactivity logging in drill holes, and electrical tracing of diamond-drill holes. The discussions centered principally on the new airborne magnetometer, the advantages of measurements from several altitudes, the causes of radioactive emanations from sedimentary rocks, and the disturbing factors introduced into electrical logs by the process of drilling. Joint meetings of geophysicists, geologists, and mining engineers were considered a desirable practice. - V. S.

8585. Langley, K. J. Brazil Shows Good Geologic Possibilities of Commercial Quantities of Petroleum. Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 34, 1946, pp. 162-164.

In Brazil, all the activities connected with oil exploration are administered by the National Petroleum Council created in 1938. The Council initiated geophysical surveys and drilling operations in the States of Bahia and Alagoas. For the geophysical work, it contracted the services of the United Geophysical Co., De Golyer & MacNaughton Co., and Schlumberger Surenco, S. A. The belt of Cretaceous sediments, where the operations are conducted, comprises the Reconcavo region around the bay of Todos os Santos. Geologically, the bay is a tectonic trough limited on the east and west by arcuated faults. A number of producing fields have been discovered in Bahia. - V. S.

86. Lee, F. W. Geophysical Exploration of Submerged Areas on the Continental Shelf of the United States Territories. U. S. Senate Special Committee Investigating Petroleum Resources, S. Res. 36, 1945, Washington, D. C., 1946, pp. 386-405.

Geophysical methods of exploration for oil are discussed in application the continental shelf of the United States. Numerous maps with explana- ry notes illustrate the geology of the shelf.
The principles of exploration on land and under water are basically the ne, for they deal with the same oil accumulations and aim at the same in- rmation. The differences consist mainly in the lack of firm foundation ndicapping orientation and the use of leveling instruments and other equip- nt. Therefore, special prospecting techniques, instrumental devices, cor- ctions, and modes of interpretation must be developed to attain the high ecision necessary; the depth of the water, climate, and local conditions so have an important part in these adjustments.
The possibilities of the adaptation of magnetic, gravimetric, seismic, d geochemical methods to the exploration of the shelf are examined in the ght of available information. The Gulf of Mexico is regarded as partic- arly suitable for underwater prospecting because of its good promise of l, shallow water, and temperate climate. Research on underwater surveys uld require a central institute with laboratory facilities for instrumental d marine investigation, processing of field data, and administration of the rk, as well as airplane hangars and ship drydocks. - V. S.

87. Lundberg, Hans. Modern Methods in Geophysics. Northern Miner, Toronto, vol. 31, No. 51, 1946, p. 21; also Min. Jour., London, vol. 226, No. 5774, 1946, p. 310; and Western Miner, Vancouver, B. C., vol. 19, No. 5, 1946, pp. 46-47.

Prospectors can make use of geophysical equipment with a little instruc- on in field techniques, and they do not need extensive theoretical knowl- ge to conduct geophysical surveys. Some instruments are simple to operate t scientifically sound and sufficiently sensitive to be effective. In the se of complex geology, novices may consult expert geophysicists. Equip- nt should be rentable on reasonable terms.
In Canada, most suitable for metals prospecting are the magnetic and ectrical methods. Similar to other tools, they have their limitations. ck formations abound in magnetic and electrically conductive bodies that ssess no commercial value and dictate caution. However, when both imagi- tion and skill are used in correlating magnetic and electrical data and servations of topography, soil, water, rock outcrops, and vegetation, the forts bear results.
The exploration of deep deposits and the use of the latest geophysical struments usually require more preparation than mere mastery of apparatus d field techniques. Some of the new inventions made during the war promise bstantial gains in the depth and expanse of surveys. (A review appeared in n. Mag., London, vol. 75, No. 1, 1946, pp. 59-60.) - V. S.

8588. Merritt, J. W. Geotechniques of Oil Exploration. Oil Weekly, Houston, Tex., vol. 121, No. 5, 1946, pp. 17-22, 26.

Different geophysical methods of oil exploration are discussed in their common dependence on the basic phenomena of petroleum genesis. Considerations is devoted to electrical, geothermal, and radioactivity methods classed as direct, and to seismic, gravimetric, and magnetic methods classes as indirect.

Factors common to both classes of methods relate mostly to the conditions or to the effects of oil accumulations. (1.) Oil is usually found in water-bearing strata, with water composition pointing to sea origin; it floats on the water and migrates along the relief until trapped in reservoirs created by the forces of compression, tension, or processes of sedimentation, pore formation, etc. (2.) Oil accumulation results in the escape of light hydrocarbons, their water loading, modification by radioactivity and evaporation, a replacement by solutions from adjacent rocks, concentration and partial precipitation of solid compounds, and an increase in the density of the bed rocks.

These phenomena affect the velocity of sound waves, increase electrical conductivity, radioactive intensity, and gravity, attract the hydrocarbon-feeding bacteria, etc. Such common causes explain the interdependence of different methods and clarify the general conditions of successful operation, such as sufficient density of test points, control of variables, rectification of errors, skillful interpretation, etc. - V. S.

8589. Mitchell, D. R. Geological Sessions Include a Bit of Geophysics and Fluorescence. Min. & Metal., New York, vol. 27, No. 472, 1946, p. 225.

Geophysicists presented papers on magnetic and electrical exploration at the sessions of mining geologists held at the A.I.M.E. annual meeting of 1945 in Chicago. (1.) Reports on magnetic exploration: R. H. B. Jones' paper indicated that the most highly magnetic chrome-ore is not always the richest, as evidenced by measurements on the Mesabi Range. H. E. Hawkes showed by an example in the Adirondacks that reconnaissance can be rapid and cheap if guided by geological information. F. H. Kihlstedt reported on the discovery of a large magnetite deposit in Larap, P. I., made owing to correct understanding of an unusual type of geological structure. (2.) Reports on electric exploration: S. F. Kelly's survey at the Chelan deposit, Washington, rapidly restricted the areas deserving further detailed study. R. A. Clark discovered ore at the Molton Hill deposit, Quebec, by following a shear zone identified by means of geological evidence. - V. S.

8590. Mitchell, W. R., and Wipff, F. P. Q-Meter for Low-Frequency Reactor Measurements (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 97.

A direct-reading Q meter is described that permits the determination of Q and inductance over a frequency range of 10-1,000 cycles and a voltage range of 2-10,000 millivolts. The instrument is particularly well-adapted o the measurement of reactors and transformers used in geophysical equipment. The theory of operation of the Q meter is given, and some of the precaustionsthat must be observed are discussed. The schematic diagram and hotographs of the instrument are included, and some of the more important onstructional details are discussed. - Authors' abs.

8591. Oil and Gas Journal. Venezuela's 1946 Exploratory Program Biggest in Histroy. Tulsa, Okla., vol. 44, No. 34, 1946, pp. 265-273.

The program of oil search in Venezuela during 1946 calls for the largest xploration campaign in histroy. Such intensive work is proposed because he local law governing concessions requires that the acreage held for deailed exploration be selected during a period of 3 years; the time for the resent concessions expires mostly about the end of 1947. During 1945, exloration was on a greater scale than ever before. In all, 27 seismic, 9 ravimetric, and 14 geological parties worked in the field; among them, 19 eismic parties explored eastern Venezuela. The geographic distribution of eophysical surveys is indicated, and some details of the work are given. here was also considerable photogeoloical surveying, as well as photogrametric work and test drilling. The program for 1946 calls for seismic, ravimetric, and magnetic exploration. - V. S.

Rankine, A. O., and Evans, P. Geophysical Prospecting for Oil in India. Petrol. Times, London, vol. 50, No. 1,272, 1946, pp. 432-434 (see abs. 8490 in this issue).

8592. Rozlosnik, Andres. Antecedentes e perspectivas futuras da exploracao petrolifera Argentina (Antecedents and Prospects of Oil Exploration in Argentina). Mineracao e Metalurgia, Rio de Janeiro, Brazil, vol. 10, No. 56, 1945, pp. 65-74.

The author reviews petroleum exploration in Argentina during the periods 1907-23, 1924-32, and 1933-45. The progress achieved is discussed step by step and illustrated by maps; particular attention is devoted to the provinces of Neuguen, Salta, Jujuy, and Mendoza. Total statistics as of January 1945 show the following geophysical coverage: Torsion balance, 220,460 sq. km.; gravimeter, 162,790 sq. km.; magnetometer, 39,367 sq. km.; seismic refraction, 70,432 sq. km.; and seismic reflection, 17,292 sq. km. The future prospects of exploration are examined for Gondwana, Chaco-Paraense, Salado, and other rock units. -- V. S.

8593. Tiratsoo, E. N. Future Role of Air Transport in the Search for Oil. Petrol., London, vol. 9, No. 2, 1946, p. 32.

In the immediate postwar years, airplanes will serve the following purposes in oil exploration: (1) Preliminary reconnaissance of areas to discover drainage, physiographic features, and potential structures;

(2) detailed examination of selected structures by means of vertical and oblique photographs; (3) landing of the ground crews; and (4) supplying land parties with parachuted stores, equipment, etc. The techniques of flying, photographing, parachuting, and cumminication are discussed briefly. - V. S.

8594. Todd, J. D. North Florida is Geologically Attractive. World Petrol., New York, vol. 17, No. 3, 1946, pp. 44-46, 94.

Florida north of the Central Platform and the related parts of Georgia and Alabama increasingly attract the attention of oil companies. The subsurface here is not flat, as had been supposed, but consists of a varied relief known to hold promising structures; the local geology is described. Geophysical activity has been growing yearly and attained a high of 1,397 crew weeks in 1945.

The magnetometer proves the most effective instrument for delineating the basement. The gravimeter is widely used for mapping large areas; gravity and magnetic observations are sometimes combined. The seismograph has encountered considerable difficulties because of cavernous surface, ground roll, absence of deeper reflecting changes, lateral velocity variations, and unfamiliar terrain; however, shallow reflection may have some possibilities. Generally, the North Florida Province is regarded as a very promising oil region. - V. S.

8595. Vinson, Curtis. Mexico Intensifies Search for Petroleum. Petroleo Interamericano, Tulsa, Okla., vol. 4, No. 2, 1946, pp. 34-43.

In Mexico, the Government corporation "Petróleos Mexicanos" (Pemex) has expanded its search for oil during recent years. The number of prospecting parties totaled 16 in 1943, 24 in 1944, and 29 in 1945, the latter number comprising 17 geological, 6 seismograph, 4 gravimeter, 1 electrical, and 1 core-drilling parties. Intensive search is carried on in the Nuevo Leon, Tamaulipas, Tampico-Tuxpan, Isthmus, and Lower California regions; there is also activity in Chihuahua, Oaxaca, Guerrero, Tabasco, Nayarit, and Chiapas. The distribution of the parties and the results of their work are described. In 1946, the number of parties probably will be increased to 35 or more. - V. S.

8596. Wooley, W. C. Geophysical History of the La Gloria Field, Jim Wells and Brooks Counties, Texas. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 292-301.

This paper presents a historical record of geophysical activity in the area of the La Gloria field. The successive stages of geophysical exploration were (1) torsion balance, Magnolia Petroleum Co., 1934-35; (2) seismograph: correlation reflection, Independent Exploration Co., 1936; dip reflection, Magnolia Petroleum Co., 1938; and (3) gravimeter, Coastal Oil Finding Co., 1945. The discovery well, Magnolia's Sam Maun, was drilled and completed in 1938-1939, and produced initially 165 barrels.

Oil and gas in the La Gloria field are being produced from sands in the io formation of Oligocene age. A number of sands produce gas distillate. veral flank wells produce oil. - Author's abs.; abridged by V. S.

97. World Petroleum. Marsh Buggies Hunt Oil in Swamplands. New York, vol. 16, No. 10, 1945, p. 90.

Geophysical exploration in swamplands such as those in the Gulf States d Central America will be facilitated by the new amphibious vehicles for e transportation of equipment and personnel. These "buggies" bear floating res 10 feet in diameter, weighing 315 pounds, containing an inner tube of 5 pounds, and mounted on hollow, air-tight, aluminum wheels. Accordingly, e buggies can navigate in streams and lakes of any depth, and they operate marsh and dry land. The tires and wheels are manufactured by the Good- ar Co. The Gulf Research & Development Co. will use the buggies in caragua. - V. S.

9. RELATED NON-GEOPHYSICAL SUBJECTS

598. Andronov, I. Oil in the Devonian Strata. Petroleum, London, vol. 9. No. 3, 1946, p. 50.

Devonian strata once yielded large quantities of oil in Pennsylvania. present, much Devonian oil is being discovered in the U.S.S.R. The de- osits, the first of their kind in that country, lie mostly in the Volga- shkiria-Urals triangle. Originally identified by I. Gubkin before World ar II, they were surveyed during the war and drilled in 1944. The largest roduction is obtained along the Samarskaia Luka-Tuimazy line and about rasnokamsk. There are also Devonian deposits outside this triangle, north- ard near Ukhta, southward near Saratov, and west of Swedlovsk. - V. S.

599. Bays, C. A. Petroleum Possibilities of Maquoketa and "Trenton" in Illinois. Illinois Geological Survey, Rept. of Investigations 105, Urbana, Ill., 1945, pp. 35-38.

Possibilities of commercial petroleum production from the Maquoketa and Trenton" strata of Illinois are most likely to occur in the sandstones of he Maquoketa formation and the areas of secondary permeability in the alena formation. There has been insufficient testing of strata below the ecorah formation. The southwestern portion of the State is recommended or exploration of the Maquoketa formations, and the area flanking the zark uplift in southwestern Illinois is thought to be most favorable for esting the Galena formation. Inasmuch as the evidence suggests anticlinal ather than stratigraphic-trap control of production, normal structural ethods of surface, subsurface, and geophysical exploration are applicable. - uthor's abs.

8600. DeGolyer, E., and Vance, H. Bibliography on the Petroleum Industry. Texas A & M College, College Station, 1944 (1945), 730 pp. Price, $2.

The references of this bibliography on the petroleum industry are arranged under the following headings: General Data; Geographic Distribution; Physical and Chemical Properties; Exploration and Prospecting; Geology; Development of Deposits; Production; Transportation, Storage and Gaging; Refineries and Refinery Practice; and Economics of the Petroleum Industry. These are further subdivided under some 900 subjects by means of the decimal system. An alphabetical subject list at the end permits one to run down a desired article or subject. The arrangement under the subheadings is by title. - Review, Econ. Geol., vol. 41, No. 3, 19[illegible], p. 285; abridged by V. S.

8601. Department of Mines and Resources, Canada. Geological Map of the Dominion of Canada. Mines and Geology Branch, Ottawa, Map 820A, 1945. Price $0.50.

This map is published as two sheets, each 44 x 32 inches, on a scale of 1 : 3,801,600 (1 inch = 60 miles) on a Lambert conformal conic projection. A fortunate choice of colors, in good register and applied to a new base, depicts the geology of the vast reaches of Canada in considerable detail. The details vary from place to place and are gratest in the marginal parts of the Laurentian shield and in the southern and western parts of Canada in general, reflecting the greater knowledge of these more accessible and more important mineral-producing areas. - F. J. Pettijohn, Jour. Geol., vol. 54, No. 2, 1946, p. 135; condensed by V. S.

8602. Gross, H. E. Possibilities and Problems of Drilling Beyond the Continental Shelf (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 43, 1946, pp. 57-58.

The reasoning that geological configurations do not coincide with the boundaries of continents and that formations continue into the continental shelves is advanced one step farther: It is considered that the formations do not coincide with the boundaries of continental shelves but continue into the deep floor of the ocean. This logic would also apply to the oil-bearing formations. Accordingly, the question arises: Can deposits in the deep ocean floor be exploited commercially? Some advantages and disadvantages of drilling beyond the continental shelf are listed. For drilling in water deeper than 500 to 600 feet, rigid foundations become too costly, and floating foundations would be used. The technical requirements toward floating derricks, casings, pipes, drilling platforms, anchors, stability, torsion, etc., are briefly indicated. - V. S.

8603. Krynine, P. D. The Tourmaline Group in Sediments. Jour. Geol., vol. 54, No. 2, 1946, pp. 65-87.

Tourmaline is really a complex isomorphous mineral group that can
sily be differentiated under the microscope into a series of varieties and
pes. These types are based upon the recognition of five main sources of
urmaline in sediments - granitic, pegmatitic, metamorphic injected, sedi-
ntary authigenic, and reworked sedimentary detrital. Actual examples of
e application of these concepts to the solution of problems of correlation,
terpretation, and differentiation of sediments and to the reconstruction
paleogeographic conditions are given. - Author's abs.

04. Lahee, F. H. Wildcat drilling in 1945. Oil and Gas Jour., Tulsa, Okla., vol. 44, No. 49, 1946, pp. 64-66.

A statistical account is given of wildcat drilling for oil in 30 States
the United States during 1945. In all, 21.6 percent of the holes drilled
d 23.9 of the footage were successful; that is, one producing foot was
illed for every 3.19 feet of dry hole, and one successful well for every
62 dry holes. As regards local results, Southern States gave somewhat
gher figures.

The various prospecting methods used for locating the drilling sites
d the following relative success: Geology, 833 holes productive, 2,827
y; geophysics, 142 p, 550 d; geology and geophysics, 140 p, 320 d; sundry
ntechnical, 47 p, 404 d; unknown, 52 p, 298 d; totals, 1,214 p, 4,399 d;
rand total, 5,613 holes drilled. These figures show that 23.2 percent of
e wells drilled on technical advice were productive, as contrasted with
.4 percent successful in the case of nontechnical advice. Thus, locations
ased upon technical exploration were 2.2 times as successful as those
illed without it. (Statistics for 1938-45 appeared in World Petrol., New
rk, vol. 17, No. 6, 1946, pp. 56-58.) - V. S.

Longwell, C. R. Tectonic Map of the United States. Bull. Am. Assoc. Petrol. Geol., vol. 28, 1944, Tulsa, Okla., vol. 28, 1944, pp. 1767-1774. (See abs. 8608 in this issue.)

505. Mackay, R. A. The Control of Impounding Structures in Ore Deposition. Econ. Geol., Lancaster, Pa., vol. 41, No. 1, 1946, pp. 13-46.

Various structures have been described from time to time as superimposed
trata, blankets, traps, dams, inverted ponds, and ponds. It is the theme
f this paper that the relatively impermeable barriers common to these struc-
ures have impounded the solutions in such manner as to cause the metals to
e deposited within the structure and to allow the solvent or ore carrying
luid to pass on through the relatively impermeable barrier.

It is shown that some elements require a more perfect barrier than
thers to impede their progress, and these differences are reconciled with
he general position of the metals in the hydrothermal series. The phenome-
on responsible for this impedance is held to be exosmosis if the metal is
n true solution and dialysis of ultrafiltration if the metal is in colloidal
orm. It is argued from the work of Freundlich and others that there is, in
act, a difference only in degree and not in kind between these phenomena.

The physical chemistry of the process is first dealt with, after which examples of impounding structures in the field and in the literature are described, commencing with the present author's original paper on impounding some years ago. Finally, the possible applicability of the theory to regional replacement is discussed. - Author's abs.

8606. Melton, F. A. Aerial Photography Aids Geologists. Oil Weekly, Houston, Tex., vol. 121, No. 4, 1946, pp. 48-50, 60.

The use of stereoscopic vision, shadow effects, photoindices, and mosaics as aids in the geological interpretation of aerial maps is discussed. Observations are given on the reproducibility and diagnostic value of structural irregularities, drainage patterns, plains, plateaus, weathering, erosion, creep, slump, etc. The value of aerial photographs varies with types of relief and depends primarily on the ability to recognize bedding and interpret topographic form. - V. S.

8607. National Oil Scouts and Landmen's Association. Oil and Gas Field Development in United States, 1944. Austin, Tex., Yearbook 1945, vol. 15, 926 pp.

This yearbook is a symposium of reviews of oil and gas developments in 1944 contributed by district-association editorial staffs and members. It covers geological and geophysical prospecting, wildcat exploration, proven field extensions, leasing, production, and refining in 25 States and the United States as a whole; information is largely statistical. The sections on some States include figures on the success of geophysical and other methods in locating productive wells. Such figures on all the 25 States are given in an appendix on exploratory drilling by F. H. Lahee. - V. S.

8608. National Research Council, U. S. A. Tectonic Map of the United States. Committee on Tectonics, Washington, D. C., 1944, 2 sheets. Price, $2.

This tectonic map of the United States, 1: 2,500,000, in seven colors, is prepared as an aid to structural studies, especially those of broad regional scope. It is identical in scale with the Geological Map of the United States issued by the U. S. Geological Survey in 1932, so that the two maps can be used to supplement each other. An explanatory statement by C. R. Longwell appeared under the same title (Bull. Am. Assoc. Petrol. Geol., vol. 28, 1944, pp. 1767-74); it deals with the progress of the work during 1922-44, the problems encountered, techniques of delineation, and color treatment. A preliminary edition of the map was distributed throughout the United States in 1940 to provide for corrections. (A review appeared in Jour. Geol., vol. 54, No. 1, 1946, p. 63.) - V. S.

609. Reed, L. C. San Pedro Oil Field, Province of Salta, Northern Argentina. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 4, 1946, pp. 591-605.

The San Pedro oil field in the Province of Salta is the most important
f the seven fields of northern Argentina. Like the others of the region,
t is situated in the Tarija Basin of Permo-Carboniferous age, with total
edimentary deposits probably exceeding 10,000 meters in thickness. The oil
ithin the fields of this basin is considered to be primarily of Devonian
rigin and is found irregularly accumulated in various formations up to and
ncluding Pleistocene.

The characteristic form of the structures in the Tarija Basin is a
hrust-faulted anticline, and in a number of places it appears that the
aulting has been the dominant feature, folding being somewhat superficial
nd late in the structural development. From this it is inferred that pos-
ibly the generation and migration of oil from a source bed could be post-
oned, without adverse results, until the advent of the first effective
olding. - Author's abs.; abridged by V. S.

610. Rinehart Oil News Co. of Oklahoma. Rinehart's Yearbook 1946. Tulsa, Okla., 1946. Price $10.

A statistical account is given of new pool discoveries in 15 oil-pro-
ucing States of the United States during 1945. In that year, the petroleum
ndustry gradually returned to peacetime levels. As regards prospecting,
ew areas were covered, and the already producing areas were subjected to
urther scrutiny. East of the Mississippi, exploratory surveys probed the
tlantic and Gulf coasts. In the central United States, the Desha Basin
ttracted attention. West of the Mississippi, activities increased in north-
estern New Mexico, northeastern Arizona, and parts of Utah and Colorado. -
. S.

611. Rittenhouse, G., and Carter, E. The Texture of Mississippian, Upper Devonian, and Lower Pennsylvanian Sandstones in the Appalachian Basin. U. S. Geological Survey, Washington, D. C., mim. text & table 125,183, 1946, 28 pp.

A textural analysis of outcrops and well samples promises to become a
seful method for locating stratigraphic traps of oil and gas in the Appa-
achian basin. It is based upon the dependence of texture on the hydraulic
onditions prevailing during the accumulation of sediments. Bars, beaches,
nd other sedimentary forms containing oil and gas are formed by the action
f currents and waves, which vary from place to place and determine texture.
he zones where permeable sands grade into less permeable silts and shales
onstitute potential stratigraphic traps, and they can be located. Being
nrelated to structure, these traps would not be detected by the methods now
mployed. With sufficient data, it further may be possible to work out
extural gradients indicative of reservoir conditions.

The authors present textural (size) analyses of 272 outcrop samples and 420 well samples from the sandstones of Ohio, Pennsylvania, and West Virginia. These data constitute the greatest amount of textural material of its kind accumulated in the Appalachian basin. The relation of texture to the occurrence of oil and gas will be worked out after more information is gathered. - V. S.

8612. Roberts, John. The Parent Substance of Petroleum. Petrol. Times, London, vol. 49, No. 1,257, 1945, pp. 793-795.

In their totality, the author's investigations of the major oil regions of the world, his theoretical studies, and the research of other men appear to indicate that oil deposits have resulted from two factors: (a) Natural distillation of organic matter, mainly animal, but partly vegetable, the essential temperature being 300° to 600° C., and (b) liquefaction by hydrogenation characteristic of some districts. Accordingly, the extent and productiveness of an oil field seem to depend largely on three conditions: the ruling temperature, the quantity of distillable organic matter, and the proximity of an adequate reservoir in the neighboring strata. (Last paper of a series dealing with the origin of petroleum.) - V. S.

8613. Seward, Albert. Geology for Everyman. Cambridge Univ. Press, England, 1944, 312 pp. Price $3.25.

The author first develops elementary principles and necessary facts preparatory to his systematic unfolding of British geology. His main purpose is then accomplished with the help of a series of journeys through the British Isles, which supply much of the material used to build and illustrate the histroical story. Simple significant observations are made and fitted together properly, and from these the reader is led logically to the interpretations and conclusions which geologists have reached. Interest is aroused through the observations, imagination is stimulated by the methods and results, and the study becomes easy. - R. T. C., Jour. Geol., vol. 54, No. 2, 1946, p. 135, abridged by V. S.

8614. Srewsbury, R. D. A Theory on Occurrence of Salt Domes. Oil Weekly, Houston, Tex., vol. 122, No. 1, 1946, pp. 36-39.

A theory on the occurrence of salt domes is presented to further oil exploration of the continental shelf in the Gulf of Mexico and Caribbean Sea. It explains why domes occur in clusters and where the clusters should be sought.

Salt forms large beds by precipitation from the waters of inland seas. As other sedimentary materials are washed in and accumulate, a heavy overburden is formed which presses on the salt, renders it plastic, and forces it upward. Experiments have shown that the salt rises under such pressure along the perimeter of a basin when the bottom is round.

All the necessary conditions of this mechanism are found in the Gulf
d Caribbean basins, which have served as a setting pit for erosional
bris from both continents. The thickest salt beds were formed in the
ntral part, where subsidence was greatest. In the resulting bowl-shaped
sins the salt plugs should have risen about the perimeter. Therefore,
lt domes would be expected to cluster along the ancient shoreline of the
lf and the Caribbean Sea regardless of where the present shoreline is. -
S.

15. Strakhov, N. M. On the Theory of Salt Tectonics. Compt. rend. (Doklady), Acad. Sci. U.R.S.S. Moscow, vol. 47, No. 6, 1945, pp. 421-424.

In 1941-43, the author investigated the salt formations of the
himbaevo oil region near the Urals. He reports that local evidence con-
adicts the customary interpretation of salt tectonics. Usually, a de-
sive part in the origin of piercements is attributed to the hydration of
hydrites. In the Ishimbaevo diapir folds, however, gypsum attains a very
significant thidckness, 15 to 20 meters, whereas the bulk of the intrusions
composed of anhydrites. Thus, the hydration of anhydrites has not played
important role here. The invasion of anhydrites into the roof was
fected by the same forces that squeezed the plastic rocks from under the
oughs. Inasmuch as the upper layers of these rocks happened to be an-
drites, they were the first to be forced into the roof. During further
apiisms, the salt apparently became likewise involved in the intrusion. -
S.

16. Struth, H. J. Cost of Discovering New Petroleum Reserves Continued to Increase in 1945. Petrol. Eng., Dallas, Tex., vol. 17, No. 5, 1946, pp. 51-58.

Manifold statistics on the cost of petroleum exploration in the United
ates during 1941-45 are presented. In this period, exploration increased
percent despite adverse conditions, the results of that effort showed a
crease of 58 percent, and the costs mounted 256 percent. Between 1936
d 1940, the cost of finding oil had been about 10.5 cents per barrel; in
e last 5 years it increased by 35 cents per barrel.

The causes of higher costs lie in the greater number of exploratory
lls drilled and the decrease in the quantity of oil found. For instance,
000 more holes were drilled in the last 5 years and three times as much
ney was spent on exploration, but only 55 percent as much oil was detected
in the preceeding 5 years. Discoveries per successful wildcat proved
ly 22 percent as fruitful; more particularly, in 1945 the failures to
nd oil or gas were 38 percent greater than in 1944. Two billion barrels
uld have to be discovered each year to meet future demand; at the dis-
very rate of the last 5 years, it would take 50,000 wells a year to meet
quirements. - V. S.

8617. Technical News Bulletin. New Mathematical Tables. Nat. Bu. Stand., Washington, D. C., No. 348, 1946, p. 32.

Five additional tables prepared by the Bureau's Mathematical Tables Project have been published: (1) MT34, inverse interpolation for eight-, nine-, ten-, and eleven-point direct interpolation; (2) MT35, table of coefficients for double quadrature without differences, for integrating second order differential equations; (3) MT36, formulas for direct and inverse interpolation of a complex function tabulated along equidistant circular arcs; (4) table of arc sin x, Columbia Univ. Press; and (5) table of associated Legendre functions, Columbia Univ. Press. - Condensed by V. S.

10. PATENTS

(The figure in parentheses refers to the class in which the entry stands; see list in the table of contents.)

8618. (2) Magnetic Field Responsive Device. L. F. Beach, Merrick, N. Y., and J. C. Purves, Springfield, Mass., assignors to The Purves Corp., Springfield, Mass., a corporation of Massachusetts. U. S. Patent 2,374,166 issued April 24, 1945.

In a device sensitive to an external magnetic field and adapted to produce, through interaction with an external field, voltage outputs of double the frequency of the energy employed in exciting said device, an H-shaped core of permeable magnetic material connected together at its ends to form two closed magnetic paths for the circulation of flux therein having a common leg, a pair of coils mounted on each of the portions of said core extending laterally from said common leg, the coils of each pair being on opposite sides of said common leg, said coils being connected in series in a closed, bridge circuit, a source of periodically varying, exciting voltage connected across one diagonal of the bridge circuit and an output circuit connected across the other diagonal of said bridge circuit, said coils being so constructed, correlated, and connected as to buck out components of fundamental, exciting voltage across said output when said bridge is balanced, but to supply in nonbucking relation to said output the double frequency voltage components produced in said coils through interaction with the external magnetic field. - Claims allowed, 2.

8619. (2) Flux Valve. C. F. Fragola, Brooklyn, M. C. Depp, Hempstead, and R. S. Curry, Jr., Baldwin, N. Y., assignors to Sperry Gyroscope Co., Inc., Brooklyn, N. Y., a corporation of New York. U. S. Patent 2,389,146, issued November 20, 1945.

A flux valve comprising a pair of cores each arranged in the form of similar closed frames and disposed in substantially parallel relation, means for exciting said cores with oppositely circulating fluxes of sufficient amplitude to produce varying permeability in each of said cores, and a urality of pick-up coils, each surrounding both of said cores, whereby e voltages produced in said pick-up coils will correspond to the direction an external magnetic field with respect to the sides of said core. - aims allowed, 13. (See also abs. 8512 in this issue. - V. S.).

20. (2) Means for Measuring Magnetic Fields. Gustav Barth, Berlin, Germany; vested in the Alien Property Custodian. U. S. Patent 2,390,051, issued December 4, 1945.

A system for measuring a substantially unidirectional magnetic field, mprising two magnetizable core sections of elongated shape to be exposed said field, said sections being arranged in similar directions relative each other, circuit means magnetically associated with both said sections r alternately magnetizing said sections in opposite directions, and rrent-responsive indicating means connected with said circuit means for dicating the differential effect of the resultant magnetizations of said ctions on the current in said circuit means. - Claims allowed, 2.

21. (3) Lowering Device for Large Cartridges. Thomas Dove, Jr., Pottsville, Pa., assignor to American Cyanamid & Chemical Corporation, New York, N. Y., a corporation of Delaware. U. S. Patent 2,387,701, issued October 23, 1945.

In combination an explosive package, an elongated rod penetrating the me, the end of which projects through the package, the projecting end of e rod being perforated, a breakable skewer in the perforated end of the d, and a lowering device attached to the opposite end of the rod. - aims allowed, 2.

22. (3) Spray Deflector for Shot Holes. S. D. Rogers, P. J. Rudolph, and W. L. Crawford, San Antonio, Tex., assignors to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,387,770, issued October 30, 1945.

A deflector for deflecting debris ejected from a shot hole in the iring of an explosive charge in conducting seismic surveys, including, in ombination, a shot hole casing, a fitting releasably connected to said asing, a deflector plate hinged at its bottom to said fitting and shaped nd positioned to extend in deflecting relation to the bore of said casing, nd means to removably secure the plate in said position, whereby it may be wung clear of said bore for charging and tamping the bore of said casing. - laims allowed, 5.

23. (3) Stemming Device for Explosive Charges. C. O. Tappan, Brooklyn, N. Y.; Edward J. S. Farrell, administrator of said C. O. Tappan, deceased, assignor to Kirby H. Tappan, East Hartford, Conn. U. S. Patent 2,388,232, issued October 30, 1945.

A blasting plug, including a taper mandrel disposable coaxially of the explosive-charge-receiving hole and provided at its larger end with an inner flanged head; plug sections, each having an inner tapered face slidable on the mandrel, the sections and mandrel together forming an approximately cylindrical plug; a resilient tube around the sections and said head; the sections being movable inwardly on the mandrel to compress the tube against the wall of the hole leaving a chamber between the sections and said head, the inner end lip of the tube lying against the peripheral face of the head; a resilient washer disposed around the inner end of the mandrel and closing the spaces between the sections; said head being provided with an aperture between the chamber and the face of said head at the charge; pressure of the explosive gases pressing said lip onto the head to confine and force the gases against the head to force outwardly the mandrel to further expand the sections; said washer and lip serving as a check valve to prevent outward passage of gas during the explosion, and serving to admit the inward passage of flame through said spaces and aperture and around the head, when a secondary charge is exploded at the outer end of the plug, to explode an inner charge that has misfired. - Claims allowed, 8.

8624. (3) Electric Detonator. Joseph Stuart, II, Wilmington, Del. U. S. Patent 2,389,086, issued November 13, 1945.

An electric firing device which comprises a charged shell; an ignition assembly comprising a plug of hard dielectric material inserted into the shell, said plug being of sufficient hardness and size to expand said shell and thereby provide a waterproof joint between the shell and the plug; and a bulge in that portion of the shell in contact with the plug, said bulge being formed by insertion of the plug into the shell. - Claims allowed, 6.

8625. (3) Seismic Surveying. J. A. Sharpe, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,390,187, issued Dec. 4, 1945.

Apparatus for seismic surveying, including means for generating seismic waves, a plurality of electric seismometers, each responsive only to the simultaneous rotational effect of the horizontal and vertical components of transverse waves, and means for recording the output of each said seismometer on a common record as a function of time in a manner to record each of said outputs distinguishably from the others of said outputs. - Claims allowed, 9.

8626. (3) Seismic Surveying. J. O. Parr, Jr., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,390,322, issued December 4, 1945.

In apparatus for use in seismic surveying, the combination with a seismometer for converting incoming seismic energy into electrical wave-form gnals and means for amplifying and recording such signals, said amplifying ans including thermionic valve amplifiers, means for so varying the in- rnal resistance of one of said valves in response to variation in ampli- de of such energy as to maintain the major portion of the record within able amplitude limits, and means responsive only to the arrival of energy amplitude excessively large as compared to the amplitude of reflected ves for varying the internal resistance of one of said valves with sub- antially greater rapidity than said first named resistance varying means. - aims allowed, 5.

527. (3) Directional Seismograph Pickup. R. J. Roberts, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,390,328, issued December 4, 1945.

A seismic pickup comprising, in combination, a support, a body, a coil ring suspending the body from said support, means carried by said body ranged for producing a plurality of magnetic fields, with one field having vertical direction of departure and each remaining field having a hori- ntal direction of departure, and with the direction of departure of each eld of said plurality of magnetic fields making an angle with the direction departure of the remaining fields, and a plurality of pickup coils mounted said support with each coil adjacent one of said magnetic field sources. - aims allowed, 10.

528. (3) Seismic Surveying. W. H. Mayne, San Antonio, Tex., assignor to Olive S. Petty, San Antonio 6, Tex. U. S. Patent 2,400,245, issued May 14, 1946.

In apparatus for use in seismic surveying, the combination with a eismometer for converting seismic impulses to electrical energy, a thermi- nic valve amplifier for such energy, and a recorder at a remotely located cording station for recording the amplified energy, of two conductors ffording a path over which the amplified energy is transmitted from the plifier to the recorder, gain control means associated with said amplifier, id gain control means including connections to the valve grids for applying ereto a variable bias voltage, means at the recording station operatively nnected through said conductors with said gain control means to provide e said bias voltage and thereby to effect regulation from said recording ation of the amplifier gain, and filter means associated with said gain ntrol means for blocking from the amplifier the energy of seismic fre- encies transmitted through said conductors while permitting the applicati said grids of the bias voltage provided at the recording station. - Clai llowed, 3.

529. (4) Electrical Logging. C. B. Aiken, North Plainfield, N. J., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,390,409, issued December 4, 1945.

Apparatus for investingating earth formations traversed by a bore hole, comprising a pair of spaced-apart electrodes in the bore hole, an electrical network in the bore hole and connected to said electrodes to form an impedance bridge, of which the electrodes and the intervening formation constitute one arm, high and low frequency sources of alternating current at the surface of the earth, an electrical circuit connected to said sources and said impedance bridge for supplying high- and low-frequency alternating current to the energizing diagonal of the latter, a plurality of filter means connected to the output diagonal of said bridge for separating the high- and low-frequency outputs of the bridge, a plurality of rectifying means connected to said respective filter means, indicating means at the surface of the earth, and electrical circuit means including said first-named electrical circuit for transmitting the outputs of said rectifying means to said indicating means. - Claims allowed, 5.

8630. (4) Method of and Apparatus for Electrically Determining the Formation in Wells. G. H. Ennis, Long Beach, Calif., assignor of one-half to Robert V. Funk, Long Beach, Calif. U. S. Patent 2,397,255, issued March 26, 1946.

In an apparatus for locating strata in a well in which a casing has been installed, the combination of: an external circuit between said casing and the earth; an external circuit between an electrode in said well and the earth; means for reversing the electrical potential in at least one of said electrical circuits; means for moving said electrode in said well; and means for measuring the electrical changes in at least one of said external circuits. - Claims allowed, 25.

8631. (4) Electrical Prospecting Method and Apparatus. J. W. Millington, Beaumont, Tex., assignor to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U. S. Patent 2,398,800, issued April 23, 1946.

The method of determining the location and character of strata penetrated by a bore hole comprising providing by means of a logging apparatus a plurality of different responses of the strata to the presence of the logging apparatus, producing an alternating current, varying the amplitude of said alternating current in accordance with variations in one of said responses, and simultaneously varying the frequency of said alternating current in accordance with variations in another of said responses. - Claims allowed, 12.

8632. (4) Apparatus for Electrical Well Logging. R. W. Stuart and Daniel Silverman, Tulsa, Okla., assignors to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,398,868, issued April 23, 1946.

An electrode device for use as one or more of the electrodes of an
ectrical well-logging system, said device comprising a gun provided with
bore, a projectile electrode disposed within said bore, means for driving
id electrode from the bore, and electrically conductive means insulated
rom said gun for maintaining electrical connection with said electrode after
e electrode has been driven from the bore. - Claims allowed, 3.

533. (4) Electrical Prospecting Method and Apparatus. J. M. Pearson, Aldan, Pa., and C. R. Nichols, Dallas, Tex., assignors to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U. S. Patent 2,401,371, issued June 4, 1946.

A system for logging a borehole, comprising a pair of electrical cir-
uits each including a pair of electrodes, means for moving at least one
lectrode of each pair along the borehole in fixed spaced relation to each
ther, means for impressing a voltage across one pair of electrodes, means
r periodically reversing the direction of said voltage, and means, in the
ther circuit, for separately and simultaneously exhibiting the effect on
aid circuit of the voltage impressed across the first pair of electrodes
d of the natural earth potential between said second pair of electrodes
mprising a pair of potentiometers, each including a voltage recording
evice, means for periodically reversing the voltage reading on one of said
evices due to the impressed voltage across the first pair of electrodes
hile maintaining the voltage reading due to natural earth potential thereon
nidirectional and means for periodically reversing the voltage reading on
e other of said devices due to the natural earth potential while main-
aining the voltage reading thereon due to the impressed voltage on the first
air of electrodes unidirectional. - Claims allowed, 6.

534. (5) Well Survey Method and Apparatus. R. E. Fearon, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,390,433, issued December 4, 1945.

A method of geophysical prospecting that comprises at various levels
rom a well bore or other opening in the earth bombarding the adjacent
rata with neutrons, simultaneously at substantially the same level sepa-
ately measuring the gamma rays and neutrons returning to the well bore
rom the strata, simultaneously determining the depths at which said meas-
rements are made and recording said measurements in correlation with said
eterminations of depth. - Claims allowed, 17.

535. (5) Central Electrode Support. S. A. Scherbatskoy, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,390,965 issued December 11, 1945.

An ionization chamber adapted for use in detecting radioactivity com-
rising in combination a housing, an ionizable medium in said housing, a
air of cylindrical electrodes disposed in said ionizable medium within the

housing, separate means for supporting the electrodes in concentric relationship, means forming electrical connection with said electrodes and extending outside of said housing, said means for supporting the central electrode comprising an element adapted to telescopically fit within the bottom of the central electrode, annular shoulders on said element adapted to slidably engage the inner wall of the electrode and serve as a guide when the element and electrode are moved relative to each other, means for limiting the movement of the element relative to the electrode, resilient means disposed within said central electrode and the telescoping element adapted to exert outward pressure on the telescoping element, and an insulator carried by the bottom end of the telescoping element adapted to support the telescoping member and central electrode resiliently supported thereby, whereby mechanical play imparted to the ionization chamber will be absorbed by the resilient means. - Claims allowed, 5.

8636. (5) Well Surveying. Bruno Pontecorvo, Montreal, Quebec, Canada, assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,398,324, issued April 9, 1946.

In a radiation method of logging a cased drill hole that penetrates the substrata of the earth, the improvement of simultaneously locating a cement that contains a neutron-absorbing substance disposed behind the casing in the drill hole that comprises the steps of radiating neutrons towards the walls of the drill hole from a neutron emitting source as said source traverses the drill hole and detecting secondary gamma radiations of a certain intensity from that portion of the strata surrounding the casing that is free of cement and detecting gamma radiations of different intensity from the strata adjacent the cement, thereby producing by the differences in intensity of the detected gamma radiations an indication of the location of the cement in the bore hole on a log which when recorded in correlation with the depth will be in the form of an offset. - Claims allowed, 2.

8637. (7) Electrical Method of and Apparatus for the Analysis or Identification of Gases, Vapors and the Like. L. T. Winkler, London, England. U. S. Patent 2,387,550, issued October 23, 1945.

A method of analyzing mixed gases or vapors, which comprises the steps of (a) producing an electric field between electrodes exposed to the mixture of gases to be identified to remove fortuitous ions from the gas, (b) ionizing a gas near one electrode of said field, (c) reversing the direction of the field for a period of time to cause the ions to travel from said electrode through different distances according to their respective ionmobilities, (d) producing an electric field transverse to the said travel of the ions, (e) collecting the ions from a group or groups on an electrode, and (f) measuring the charge imparted to said electrode. - Claims allowed, 11.

38. (7) Apparatus for Gas Analysis. P. S. Williams and M. W. Kriegel, Tulsa, Okla., assignors to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,389,706, issued November 27, 1945.

An assembly adapted for analyzing gases comprising, in combination, a rubbing means, an evacuating means including a mercury diffusion pump and mechanical pump, a first conduit and a second conduit each connecting said rubbing means with said diffusion pump, a stopcock controlling flow in eac said conduits adjacent said scrubbing means, a triple trap and U tube in- rted in the first conduit, a reservoir, a conduit connecting the reservoir th the first conduit, a pressure-gage assembly, a conduit fluidly con- cting the assembly to the first conduit between said triple trap and said tube, a mercury reservoir arranged adjacent said U tube, a conduit fluidly nnecting a lower portion of the U tube with a lower portion of the reser- ir, a conduit arranged for connecting said reservoir with said mechanical mp, a stopcock in said conduit, a conduit having stopcock therein connect- g an upper portion of the reservoir with the atmosphere whereby mercury y be forced into and removed from said U tube. - Claims allowed, 5.

39. (7) Method of Prospecting for Hydrocarbons. F. W. Crawford, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,398,580, issued April 16, 1946.

The method of analyzing a sample of drilling mud for hydrocarbons, ich comprises placing the sample in an isolated heating zone, rapidly acuating the readily releasable gases and vapors from the same and sepa- ting the vapors and gases thus released from the process, evacuating an olated condensing zone, establishing communication between the condensing ne and the heating zone, applying heat to the sample in the heating zone, moving heat from the vaporous effluents of the sample in the condensing ne to condense readily condensible vapors, and analyzing the uncondensed fluents for hydrocarbon content. - Claims allowed, 3.

540. (7) Geochemical Prospecting. Leo Horvitz, Houston, Tex. U. S. Patent 2,400,420, issued May 14, 1946.

A method of geochemical exploration for subterranean petroliferous posits, which comprises collecting samples of soil at spaced points in the ea to be investigated at a depth several feet below the surface, said pth being sufficient to eliminate the effect of surface conditions, sub- cting the individual samples to an analysis for the determination of the ntent thereof of a selected alkaline-earth metal and correlating the values termined with sample locations whereby the contents of the selected metal the several samples may be compared for the purpose of identifying omalously high concentrations thereof. - Claims allowed, 4.

8641. (8) Means for Testing Formations in Wells. E. V. Crowell, Glendale, Calif. U. S. Patent 2,397,473, issued April 2, 1946.

In a well-testing device for use in a well shaft, a pair of telescopically connected tubular members, one of said members forming a head for a packer and having a lateral port therein communicating the bore of the lowermost tubular member below the packer with the well shaft above the packer through said head, a single valve member movable in said head and actuated by telescopic contraction of said tubular members to close said communication with the well shaft and open communication between said tubular members through said head, and means operable in response to relative rotation between said members for controlling relative movement between said members longitudinally. - Claims allowed, 2.

8642. (9) Method of and Means for Making Fine Measurements. J. R. Cornelius, Coventry, England. U. S. Patent 2,387,496, issued October 23, 1945.

In a precision measuring indicator, the combination of an oscillator generating a wave of fixed frequency, a second oscillator for generating a wave having a frequency normally differing from the frequency of said first oscillator by a predetermined difference frequency, means for combining said waves to produce a beat wave of said difference frequency, a distance-measuring device including a movable element for varying the frequency of said second oscillator in accordance with the position of said element and being operative to vary said beat frequency above and below said normal difference frequency, a pair of tuned circuits, one tuned to a frequency higher than said normal difference frequency and the other to a frequency lower than said normal difference frequency, means for supplying said beat wave to said tuned circuits, means for rectifying the currents in said tuned circuits to produce direct current voltages, and an indicator circuit having said direct current voltages included therein in opposing relation. - Claims allowed, 6.

8643. (9) Apparatus for Continuously Predicting a Trend in Observed Data. Herbert Ziebolz, Chicago, Ill., assignor to Askania Regulator Co., Chicago, Ill., a corporation of Illinois. U. S. Patent 2,398,987, issued April 23, 1946.

Indicating apparatus of the character described comprising, in combination, a graphing device including a casing having a coordinate axis chart face; indicating members equally spaced along the abscissa axis and movable parallel with the ordinate axis having heads exposed on the chart face; screw members for actuating the indicating members to produce the outline of a graph representing characteristics of data; pairs of adding and subtracting solenoids associated with each of the screw members to impart actuating movements in either direction in accordance with the characteristics of data to be investigated; automatic means for measuring characteristics of variable specimens to be investigated and energizing the adding lenoids in accordance with such measurements to produce a graph; and sociated means for energizing the subtracting solenoids after the characristics of a predetermined number of specimens have been added, whereby ntinued operation will add and subtract impulses as additional specimens e measured. - Claims allowed, 16.

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April 1947

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

INFORMATION CIRCULAR

GEOPHYSICAL ABSTRACTS 126

JULY - SEPTEMBER 1946

COMPILED BY

V. L. SKITSKY

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

GEOPHYSICAL ABSTRACTS 126

July - September 1946[1]

Compiled by V. L. Skitsky[2]

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FOREWORD

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Washington 25, D. C.

1. GRAVITATIONAL METHODS

8644. Albin, Adriano. Un gravimetro pneumatometrico (A Pneumometric Gravimeter). Geofis. Pura & Appl., Milan, vol. 3, No. 3, 1941, pp. 165-168.

The author discusses the development of gravity measurements and offers a new type of gravimeter based upon the pneumatic principle. The original and the latest model of this apparatus are described, and the mathematical equations underlying measurements are deduced. The first model, devised in 1928, consisted of two cylinders connected by an L-shaped capillary tube; the present model has one spherical container with a horizontal, U-shaped, capillary extension over it. In both models, variations in gravity are measured in terms of the weight of a column of mercury and the gas pressure necessary to support it in the capillary tube; a change in gravity affects the weight of the mercury column and the respective pressure and volume of the gas in the container. The application of this principle by H. Haalck in 1932 gave good results. - V. S.

Barsch, Otto. Aufgaben der angewandten Geophysik in Grossdeutschland und im östlichen europaischen Raum (Problems of Applied Geophysics in Wider Germany and Eastern Europe). Jahrb. d. Reichsamts für Bodenforsch., 1942, Berlin, vol. 63, 1944, pp. 682-780. (See abs. 8737 in this issue).

645.Boyd, L. H. Gravity-Meter Survey of the Kettleman Hills-Lost Hills Trend, California. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 121-127.

The gravity anomalies produced by the three Kettleman-Hills domes are axima. The Lost-Hills anticline produces a gravity minimum. Four maps howing gravity contours, subsurface contours, and sections accompany this aper.

Maps from a gravity survey over the Kettleman Hills-Lost Hills area re compared with previously published subsurface contours and cross ections. These show that each of the three Kettleman-Hills domes produces strong and definite gravity high, whereas the Lost Hills anticline produces a very clear and closely corresponding gravity low. The paper points ut the probable cause of this unusual feature as being a transition within he Reef Ridge formation from punky, diatomaceous shale at Lost Hills to lays and sands at Kettleman Hills. - Author's abs.

646.Bulanzhe, Iu. D. On the Calculation of the Effects of Variation in Chronometer Motion on Pendulum Observations (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 49-62.

The precision of pendulum measurements of gravity depends largely on n accurate correction for variations in the motion of the chronometer. et, the currently used method does not fully account for the variations ccurring during the interval between successive corrective determinations. his interval usually is represented by separate series of pendulum oscilations between which the pendulum is not observed. In the present paper, he resulting systematic errors are examined mathematically; equations are irst deduced for the generalized problem and then employed for an approxiate determination of errors by application of graphic means. Several articular cases close to actual practice are analyzed.

The formulae obtained have been employed for computing the errors ccurring in a field survey. It was found that the interval between successive corrections for chronometer variation should be filled in by observaions of pendulum oscillations to the extent of 95 percent rather than 85 ercent, as recommended by the Instructions for Gravimetric Surveys, 1937. hen the effect of chronometer variation on the average period of pendulum scillation would not exceed 0.5×10^{-7} sec. A special method of radio ignals is also suggested for reducing chronometer errors. - V. S.

3647.Coulomb, Jean. Séismes profonds et grandes anomalies négatives de la pesanteur peuvent-ils être attribués à une extension plastique? (Can Deep-Seated Seismic Activity and Large Negative Anomalies of Gravity be Attributed to a Plastic Expansion of the Earth?). Ann. Géophys., Paris, vol. 1, No. 3, 1945, pp. 244-255.

An account is given of a previously suggested theory holding that deep-seated seismic activity and zones of negative gravitational anomalies indicate the formation of inclined surfaces. These serve as gliding plane in the initial plastic expansion of the earth resulting in ultimate thermal contraction, as described by H. Jeffreys. The author recognizes that such a theory has its weaknesses; its merits consist in establishing a relationship between gravity anomalies and seismic activity and showing that deep-seated seisms should be expected over inclined surfaces. - V. S.

8648. Deegan, C. J. Exploring the Continental Shelf. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 6, 1946, pp. 98-101.

The R. H. Ray Co., Houston, has developed two types of diving bells for gravimetric exploration under water. (1) The smaller type, with several models, is designed for shallow water up to 40 feet deep. It has a conical shape, broad base, low center of gravity, and low profile, which aid in keeping it steady despite wave action and bottom mud. As many as 25 stations have been occupied in a day. (2) The large type of the bell is suitable for water up to 250 feet deep. It weighs nearly 5,000 pounds and consists of two concentric steel cylinders welded to a common base. The space between the cylinders is used as a ballast chamber; the observer works inside the inner cylinder. This bell can occupy up to 10 stations per day.

Specially designed and equipped boats are used for hoisting. The observer has at his disposal a telephone, air hose, and electric circuit. Successful gravity measurements were made off the Gulf coast and the coast of Cuba as well as in Lake Maracaibo, Venezuela. - V. S.

8649. Enslin, J. F. A Comparison of the Gravimeter and Torsion Balance Methods of Geophysical Prospecting. Trans. Geol. Soc. South Africa 1944, Johannesburg, vol. 47, 1945, pp. 283-299.

After a concise theoretical consideration and the derivation of the probable errors of observations by torsion balance and gravimeter, the applicability of these instruments to typical geological problems is discussed. - Author's abs. (Discussion by J. Taylor, O. Weiss, and the reply of the author are given in Proc. Geol. Soc. South Africa 1945, vol. 48, 1946, pp. 57, 59, 75. - V. S.)

8650. Hedstrom, H. Report on Test Made with the Nørgaard Gravimeter in Nottinghamshire on 8th May, 1946. Craelius Co., London, 1946, 10 pp.

An account is given of a recent demonstration in the use of the Nørgaard gravimeter conducted in the vicinity of the Eakring oil field, Nottinghamshire, by the Electrical Prospecting Co. of Stockholm. Readings were taken at three stations where the gravity values are known from previous surveys; the geology of the carboniferous limestone of the area also is known. The conditions of the Eakring test, the readings made, the temperature and drift corrections, and the theory and construction of the instrument are described (see also Geoph. Abs. 125, No. 8489).

The Nørgaard values of gravity differences between the three stations ave compared with the previously obtained values, as follows: Kirklington-outhwell: 5.34 mgl. vs. 5.46 mgl; Southwell-Oxton: 5.19 mgl. vs. 5.19 mgl. A review appeared in Min. Mag., London, vol. 75, No. 1, 1946, pp. 21-26.) V. S.

651. Horton, C. W. Interpretation of Isostatic Anomalies South of Java, Using Integral Equations and Crustal Deformation Theories. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 183-194.

The gravity measurements of Vening Meinesz show the existence of a ymmetric belt of negative gravity anomalies south of Java. The mass dis-ribution on a surface 40 km. deep, which will explain the observed anomalies, s determined by the author by means of an integral equation. This mass istribution is interpreted as resulting from the deformation of a crust ormally 40 km. thick. By applying Vening Meinesz's theory to the resulting eformation, one concludes that the crust folded as though it had a Young's odulus of 10^8 dynes/cm^2.

Some comments are made on Gunn's theory of mountain formation. It is hown that his theory predicts an increase in the compressive forces in the rust of 20 dynes/cm^2/year in the Paleozoic era and of 80 dynes/cm^2/year in he Cenozoic era. These values are shown to be in fair agreement with those redicted by the thermal-contraction theory. - Author's abs.

3652. Kazinskii, V. A. On the Precision of the Determination of Gradients of Curvature (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 382-388.

Variometer measurements give the second derivatives of the potential f gravity expressed by formulae comprising the gradient of turbulence T. This gradient characterizes the undulations of the geoid and the hetero-geneity of the earth's crust, and its second derivatives, termed gradient f gravity and gradient of curvature, have much value for geophysicists. owever, the gradient of curvature receives little application because it is deemed to be more dependent on topographic relief than the gradient of ravity. Such view is caused by the inclusion of r^3 (distance) in the xpressions of the integrals used for reduction.

The author has calculated the effects of relief upon the gradients of ravity and curvature both for the data of laboratory experiments and for 90 variometer stations in the Moscow district. The empirical results showed that the precision of reduction is about equal for both types of gradients. An explanation of such findings is sought in the total products $r^2h^2\text{Sin}\alpha$, $r^2h^2\text{Cos}\alpha$, $r^3h\ \text{Sin}2\alpha$, $r^3h\ \text{Cos}2\alpha$, and their sum entering into the reduction integrals, rather than in the value of r^3 alone. It is pointed out that the varying signs of h, Sinα, and Cosα produce both positive and negative values f these products and lead to their balancing. - V. S.

8653.Maree, B. D. The Vredefort Structure as Revealed by a Gravimetric Survey. Trans. Geol. Soc. South Africa 1944, Johannesburg, vol. 47, 1945, pp. 183-196.

Large and easily recognizable gravitational anomalies were found to exist in the sedimentary belts of this structure, and when these anomalies were traced to the covered southeastern portion, the structure was found to have rather the shape of a pear, with its smaller end pointing to the southeast, instead of being circular. Based upon this new information and the regional distribution and attitudes of the gravitational anomalies and geological structures, a new explanation of the origin of the structure is put forward. - Author's abs. (Discussion by J. Ellis, J. Taylor, O. Weiss, and the author's reply are given in Proc. Geol. Soc. South Africa, 1945, vol. 48, 1946, pp. 49, 54, 55, 71. - V. S.)

8654.Miller, A. H. Gravimetric Surveys of 1944 in New Brunswick (abs.). Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 39, 1945, List and Minutes, p. 145.

In addition to other work in the Maritimes, several hundred miles of gravimeter traverse were made over the Carboniferous basin between Moncton and Bathurst with the object of finding buried pre-Carboniferous ridges that are presumed to underlie the flat-lying Carboniferous sediments. The profile of gravity across the basin is a series of "highs" and intervening "lows." Certain of the axes of strike of the anomalies, inferred from more or less parallel traverses, may correspond to structural axes. The salt deposit at Weldon is indicated by contours of low values of gravity. - Author's abs.

8655.Nettleton, L. L. Geophysical History of Typical Mississippi Salt Domes (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98.

This paper gives the results of gravity and seismograph exploration of typical shallow domes in the Mississippi salt-dome basin. The domes were first indicated by reconnaissance gravity surveys and were further defined by detailed gravity surveys. Depth and configuration of the cap rock was determined by refraction seismograph surveys. The geophysical predictions are compared with the findings of subsequent drilling. - Author's abs.

8656.Pawlowski, Stanislaw. Pomiary grawimetryczne w Polsce do r. 1938 wlacznie (Gravimetric Measurements in Poland through 1938). Panstwowa Sluzba Geologiczna, Warsaw, Bull. 18, 1939, pp. 46-51.

A review is presented of gravimetric exploration in Poland from its beginning in 1866 to 1938. The initial surveys are indicated briefly; the more active work of 1926-36 is given fuller consideration, with statistical summary; finally, the latest exploration of 1937-38 is described in some etails. In the last-named period, surveys were made with the Thyssen gravi- eter in western and eastern Poland and in the pre-Carpathian region; some articulars of operational techniques are specified. In all, the results w give the distribution of gravity anomalies over entire Poland, as shown n the appended sketch map. The account of gravity work is accompanied by rief outlines of magnetic, seismic, and electrical investigation in Poland. V. S.

657. Scheffer, Vittorio. L'anticlinale gravimetrica di Fontevivo (The Gravimetry of the Anticline of Fontevivo). Geofis. Pura & Appl., Milan, vol. 3, No. 1, 1941, pp. 12-13.

The anticlinal formation of Fontevivo, Parma, was explored gravimetri- ally in 1940 to aid geological mapping. The Humble-Truman gravimeter served or the survey which occupied 63 stations. In 1928, the same area had been urveyed with a German torsion balance by A. Belluigi over 400 stations. The esults of the two investigations are compared and found to agree closely; he values of anomalies almost coincide. The isogam maps obtained by the two ethods are presented. - V. S.

658. Vening-Meinesz, F. A. Topography and Gravity in the North Atlantic Ocean. Proc. Nederl. Akad. Wet., Amsterdam, vol. 45, No. 2, 1942, pp. 120-125.

During the gravity expeditions at sea conducted by the Netherlands eodetic Commission, numerous observations were made over the Azores Archi- elago and between the Azores and Europe. Recently, this material has been ubjected to reduction by means of the new tables for regional and local sostatic compensation calculated according to the Airy system.

The results indicate that some of the topographic features are more or ess locally compensated and others are regionally compensated. In the zores, the Sao Miguel and Fayal Islands show a much smaller degree of egionality than is usual for volcanic islands. To the west and southwest f the Azores, stations over deep water are in better agreement for local han for regional reduction. In the Iberian peninsula, the Josephine Bank ppears regionally compensated in the west and locally compensated in the orth; the submarine promontory west of Cape Finisterre is locally compen- ated in the south and regionally compensated in the north. Some other esults obtained by the compensation of anomalies are described. One of the xplanations suggested for disturbances of isostatic equilibrium is the ising of heavy magmatic material in the deeper layers and the failure of the orresponding adjustments to keep pace therewith. - V. S.

2. MAGNETIC METHODS

Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Redbank Copper-field, Northern Territory. Report for period ended 31 December, 1940, Canberra, 1942, pp. 60-63. (See abs. 8705 in this issue.)

8659. Balsley, J. R., Jr. The Airborne Magnetometer. U. S. Geological Survey, Washington, D. C., Geophysical Investigations, Prelim. Rep. 3, 1946, 8 pp.; also Petrol. Eng., Dallas, Tex., vol. 17, 1946, No. 11, pp. 77-87, No. 12, pp. 104-130.

The airborne magnetometer for geophysical exploration, developed jointly by the Naval Ordnance, Bell Telephone Co., and U. S. Geological Survey, is a flux-gate detector that measures total magnetic intensity electronically, with continuous registration of readings on a standard record chart. The sensitivity and base-line value can be varied instantly in 50 to 5,000 gamma steps by special controls, the sensitivity being registered on the record chart; the recording meter also may be adjusted to any horizontal scale, the most practicable being 0.5 to 2.0 miles to the inch.

During flights, the detector proper is towed in a bomb-shaped shell on a 100-foot cable to eliminate the magnetic effects of the plane. The method of survey generally consists in covering a series of parallel traverses 50 miles long made at right angles to the geological grain while maintaining a constant average height. In land surveys, ground orientation is gained by a gyroscopically stabilized continuous-strip camera and a radio altmeter. Over water or unmapped areas, the radio navigation aid Shoran can be used to record distances from two ground stations. The flight data eventually are coordinated by means of a mechanical device, which transforms the recorded curve to orthogonal coordinates, corrects discontinuities in the recording, and adjusts the distance scales. The profiles are then plotted on a magnetic contour map.

Magnetic surveys from the air have the advantages of precision, speed, ease, economy, and access to impassable terrain, but also the disadvantages of close dependence on the accuracy of ground maps and use of large airplanes and heavy equipment restricting the work to large-scale exploration. - V.S.

8660. Barnett, S. J. Two Electric Generators Suitable for the Measurement of Magnetic Intensities and Their Variations, and for Other Purposes. Terr. Magn. & Atm. Elec., Baltimore, Md., vol. 51, No. 2, 1946, pp. 147-162.

The detection and measurement of magnetic intensities has often been made by means of rotating coils with terminals connected through commutators to measuring devices. However, such apparatus have their disadvantages because of the fine coil wire necessary for high sensitivity and the sliding contacts with the brushes. The author overcomes these difficulties by using a fixed coil with a large constant and combining it with a toroidal ring of low resistance rotating inside the coil. In a later model, the ring is replaced by a group of rotating magnetic rods. The theory of the ring generators and rod generators is presented, and the experiments, results, and applications are described. The generators can serve as vertical intensity variometers. - V. S.

Broadhurst, E. Geophysical Prospecting at Moonta and Kadina. Chem. Eng. & Min. Rev., Melbourne, Australia, vol. 38, No. 450, 1946, pp. 197-203. (See abs. 8709 in this issue.)

661. Digiesi, Domenico. La carta magnetica della Libia recentemente compilata dall' Istituto Geografico Militare (Magnetic Map of Libia Recently Compiled by the Military Geographical Institute). Geofis. Pura & Appl., Milan, vol. 3, No. 2, 1941, pp. 45-51.

In 1938-40 the Italian Military Geographical Institute made a survey of magnetic declination in Libia. A total of 203 stations was occupied with the apparatus of Chasselon, a magnetic theodolite, and a compass, in conjunction with preliminary photogrammetric reconnaissance. The phases of the work are described, and the principal data are tabulated. The results have been embodied in an isogon map referred to January 1, 1941, which is appended. It reveals strong anomalies south of Tripoli. - V. S.

662. Dufay, Jean, and Flajolet, Philippe. Relation entre l'activité solaire et les perturbations de la déclinaison magnétique enregistrées à Saint-Genis-Laval (Relation between Solar Activity and the Disturbances of Magnetic Declination Registered at Saint-Genis-Laval). Ann. Géophys., Paris, vol. 1, No. 3, 1945, pp. 264-274.

Statistical analysis of magnetic and solar observations shows that a correlation of +0.58 exists between the annual averages of the amplitude of the variation of declination and the relative index numbers of Wolf-Wolfer; with the increase of solar activity, the correlation reaches +0.76, and with the decrease it declines to +0.45. As usual, the monthly averages of amplitude show the well-known maxima of February-March and October; but such maxima become more pronounced during years of increased solar activity. These results are based upon observations made during 58 years and are in agreement with the findings of Kostizin at Parc Saint-Maur.

The totality of the evidence seems to fit into the hypothesis that magnetic disturbances are caused by rays emitted by the parts of the sun adjacent to sun spots. Supporting considerations and examples are given. - V. S.

663. Eckhardt, E. A. Airborne Magnetometer. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 5, 1946, pp. 78-79, 91-92.

The airborne magnetometer of the Gulf Research & Development Co. is an adaptation of the saturated-core magnetometer of V. Vacquier having no movable parts affected by acceleration (Geoph. Abs. 122, No. 8083). The war brought about an application of this magnetometer to several military purposes, among them the detection of submarines from the air. Eventually, the airborne magnetometer was adapted to exploration for mineral deposits, and successful test-surveys were made over extensive areas containing oil and iron.

In its final form, the Gulf airborne unit for magnetic exploration is equipped with devices for high sensitivity, automatic orientation-stabilization, elimination of irrelevant influences, continuous recording of measurement, and registration of ground trace by photography or radar. It can operate from a wide range of altitudes and at different flight velocities, possesses a sensitivity of over 1 gamma, permits the surveying of water-covered and other inaccessible terrain, increases the speed of the work, and reduces the cost of exploration. The various instruments composing the apparatus are described. - V. S.

8664. Howe, H. H. Magnetic Observatory Results at College, Near Fairbanks, Alaska, for the Second Polar Year, October 1932 to March 1934. U. S. Coast and Geodetic Survey, Washington, D. C., MO-21, 1944, 179 pp.

This publication contains extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, collected mean diurnal variations for each month, season, and year, lists of principal magnetic disturbances, amounts of noncyclic change, observed and adopted base-line values of the D, H, and Z variometers with their abrupt changes, etc. The text furnishes a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Author's abs.

8665. International Nickel Co. of Canada, R. C. Rowe, ed. The Operations and Plants of the International Nickel Company. Canadian Min. Jour., Gardenville, Que., vol. 67, No. 5, 1946, pp. 309-554.

This report includes a brief statement on the field procedures used by the International Nickel Co. in its detailed magnetic surveys for metals. The Askania magnetometer and the Hotchkiss Superdip serve for measurements. Base lines are run about 2,000 feet apart and parallel to the long axis of the area explored, with readings taken at intervals of 200 feet, and cross lines are run between the base lines with readings taken at intervals of 100 feet. A grid is thus produced on centers of 100 by 200 feet. The instruments are checked at each crossing of the base lines. - V. S.

8666. Keller, Fred, Jr. The Magnetic Work of the U. S. Coast and Geodetic Survey at Parícutin Volcano, Michoacan, Mexico, 1945. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, pp. 350-363.

The geomagnetic field in the vicinity of Parícutin was investigated to ascertain whether the development of a volcano produces deep-seated magnetic changes. The method consisted in measuring vertical intensity at proximate and remote stations and determining whether the difference between those measurements changed with time. The instruments included an Askania vertical-intensity field balance, a continuously recording magnetograph, a Coast and Geodetic Survey absolute magnetometer, and three seismographs; a base station served for checks.

The differences observed with time between the measurements taken are plotted in curves. The results show that the variation of vertical intensity at the proximate stations is much larger than the variation at the distant stations. The magnitude and distribution of these variations indicates that a slight warping of the magnetic field is taking place about Parícutin, the change being most pronounced to the north of the volcano. - V. S.

3667. Koulomzine, F. Application of Geophysical Prospecting to the Pre-Cambrian Shield. Canadian Min. Jour., Gardenvale, Que., vol. 67, No. 10, 1946, pp. 933-940; also Western Miner, Vancouver, B. C., vol. 19, No. 7, 1946, pp. 37-39.

The pre-Cambrian Shield that yields most of Canadian mineral production s largely covered by an overburden of sand, clay, and boulders 10 to 300 feet thick. Accordingly, the principal means of exploration are diamond drilling and geophysical prospecting, the magnetic and electrical methods being the most suitable. The author discusses the magnetic investigations, choosing typical examples among the 140 surveys conducted by the firm of Koulomzine, Geoffroy, Brossard & Co. during the last 10 years.

The Bourlamaque survey revealed a large and complex intrusive mass that contained ore and gold deposits. The Vassan survey detected an intrusive mass under Lake Demontigny that carried gold-bearing intersections. The Malartic survey disclosed folding and faults bearing ore intersections. Finally, the Quemont survey led to the discovery of ore under Lake Osisko. The general conclusion drawn from this work is the cardinal dependence of geophysical exploration on geology, without which no results could have been obtained. - V. S.

3668. Kutscher, Fritz. Erdmagnetische Messungen auf Magnetitlagerstätten im südlichen Riesengebirge (Geomagnetic Measurements of Magnetite Deposits in Southern Riesengebirge). Ztschr. prakt. Geol., Halle, vol. 49, No. 4, 1941, pp. 39-45.

In 1940, magnetic surveys were made of a series of magnetite deposits in the southern Riesengebirge, Czechoslovakia. The local geology is described. Generally, these magnetites are strongly magnetic and embedded in magnetically weaker formations; e.g., phyllite 90 x 10^{-6}, amphibolite 10 x 10^{-6} to 9,000 x 10^{-6}, according to magnetite content, and magnetic iron 0.1 to 1.6. The measurements were made of vertical magnetic intensity with the Askania balance; the field procedures and calculations developed by H. Reich were adopted, with particular emphasis upon a close network; isoanomaly maps were plotted.

The results of the surveys near Hackelsdorf, Gross-Aupa, Ober-Kleinaupa, and Petzer are described and illustrated by isoanomaly charts and ΔZ profiles. They reveal a number of pronounced anomalies. - V. S.

8669. Marce, B. D. Notes on Some Magnetometric Surveys, with Special Reference to Anomalies on Karroo Dolerites. Trans. Geol. Soc. South Africa 1943, Johannesburg, vol. 46, 1944, pp. 107-118.

The magnetometric anomalies obtained on Karroo dolerites and the interpretation of these anomalies are described. The use of the magnetometer for the selection of sites for water boreholes on granites is discussed, with additional reference to the delineation of a Karroo basin underlain by Bushveld granite. - Author's abs.

8670. Muffly, Gary. The Airborne Magnetometer. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 321-334.

This paper discusses the problem of magnetic exploration for oil from an aircraft. A new type of saturation magnetometer is described. Various orientation and stabilization schemes and their application to submarine detection and geophysical prospecting are discussed. It is shown that total-field measurement is far superior to vertical-component measurement. The newest Gulf apparatus using an automatically stabilized, continuously recording total-field magnetometer is described. - Author's abs.

Nikiforov, N. A. Geophysical Methods as Means of Detecting and Studying Gold Deposits (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 389-398. (See abs. 8716 in this issue)

8671. Obruchev, V. A., and Grigoriev, D. P. Native Magnetic Gold. Compt. rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 46, 1945, pp. 290-292.

Small, dull flakes of gold from Yakutsk district, USSR, are magnetic with polarity, the susceptibility $\chi = 0.040$ C.G.S. μ_0 being between that of pyrrhotine and ilmenite. Analysis by K. A. Nenadkevich gave Au 78.24, Ag 17.23, Fe 4.4 percent. This composition falls on the boundary of the $AuFe_3$ field in the system Au-Fe. - L.J.S., Mineral Mag., London, vol. 27, No. 193, 1946, Abstracts, p. 258.

8672. Seeley, S. W. Shoran Precision Radar. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 9, 1946, pp. 74-75.

Shoran radar serves for high-precision position finding in aerial navigation and mapping; the name stands for short range, up to 250 miles. The esearch was initiated by the Radio Corporation of America in 1938 and was ken over by the United States Army and Navy during the war. Military tests f geological application gave a "first order survey accuracy" of about 1 oot in 5 miles.

The method of determining position in flying consists of triangulation means of radar waves. Two ground stations with a known distance between hem are needed. The plane crew sends out pulses to each station and receives hem back, measuring the round-trip time for determining the distance from oth points. The equipment on the plane comprises a transmitter, a receiver, pulse-timing unit, a Veeder counter, and accessory instruments. Each ground ations has a receiver-monitor, transmitter, power generator, antenna arrays, c.; this equipment is air-transportable and can be installed in 90 minutes. he operation of the various apparatus is described. Flight techniques differ ith the problems; several planes can operate from the same two or more ground ations. Usually, the base line connecting the stations is crossed back and orth, or circular arcs are flown around one of the stations. - V. S.

573.Skillings' Mining Review. Employ Helicopter for First Time to Explore Remote Mining Regions. Duluth, Minn., vol. 35, No. 12, 1946, p. 1. Also, Montana Oil Jour., Great Falls, Mont., vol. 26, No. 18, 1946, p. 8.

An expedition headed by H. Lundberg is making extensive tests of magnetic urveying with a helicopter over mineral areas in Sudbury, Ontario. The Bell ircraft Corp. of Buffalo has placed at its disposal a Model 47 couple-type elicopter, pilots, technicians, and accessories. The craft satisfies the equirements of minimum vibration, variable speed, maneuverability, motionless loating, and easy take-off and alighting. It is equipped with magnetic nstruments developed by Lundberg, which are reported to be capable of surpassing the airplane-borne magnetometer of the United States Navy; their nature as not been revealed. In airplane surveys, correlation of magnetic readings ith points on the ground is handicapped by fast motion, whereas the helicopter makes it possible to maneuver back and forth, up and down over an anomaly ntil the exact place registering the largest deviation is determined. It is roposed to extend the tests to remote regions of northern Canada. - V. S.

574.V'iunov, B. F. The Role of Meteoric Streams in the Generation of Magnetic Storms and Aurora Borealis (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 294-315.

The study of magnetic storms and aurora points to their partial dependence upon the fall of meteorites on the earth. The author has analyzed the ata gathered on 1,103 magnetic storms and 512 auroras during several decades f observation and found that periods of a denser streaming of meteorites oincide with periods of greatest magnetic disturbance and auroral frequency; he earth apparently crosses the meteoric streams in March, September, and ctober. However, the fall of meteorites is not the only factor related to agnetic storms and aurora. The total complex of inter-related phenomena ncludes such other factors as sun spots, ionosphere disturbances, and eteorological conditions. - V. S.

3. SEISMIC METHODS

8675. Berson, I. S. Spatial Problem of the Interpretation of Hodographs of Refracted Waves: One Plane Contact-Boundary (abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-1944, Moscow, 1945, p. 115.

The interpretation of hodographs of refracted waves currently is being expanded to include three-dimensional cases. In this development, the first problem is the simplest case of a plane contact-boundary. This is here examined in application to penetrating and nonpenetrating waves encountering a single horizontal contact-surface. Diagnostic indications are given on systems of hodographs allowing a unique interpretative solution, and methods are offered for their calculation. Consideration also is devoted to the interpretation of transverse hodographs and to methods of finding definite solutions for them. (To be published in Trans. Inst. Theor. Geophys., Moscow) - V. S.

8676. Berson, I. S. Hodographs of Reflected Waves and their Interpretation by Means of the Horizontal Gradient of Velocity (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 21-35.

In the interpretation of hodographs of reflected waves, a failure to take the horizontal gradient of velocity into account may lead to grave errors. Such gradient is best determined by means of a seismic coring of boreholes in the explored area. It may also be estimated by interpreting certain aspects of velocity in hodographs commensurable in their length with the depth of the reflecting horizon. The equation of a hodograph is deduced for the case of one horizontal contact-surface and a horizontal, linear change of velocity. An analysis also is made of the distortions produced in the actual shape of the reflecting boundaries by the assumption of an average constant velocity in the interpretation.

As the value of the angle of such distortions increases with an increase in the horizontal gradient of velocity and the depth of the reflecting boundary, seismic reflection is virtually inapplicable to the exploration of deep, inclined formations when the horizontal gradient is unknown. For the case when it is known, a method of approximate interpretation of hodographs is offered for determining the depth and shape of the reflecting boundary. - V. S

8677. Boyer, G. L., Jr., and Shepard, Ward, Jr. A Recording Six-Trace Cathode-Ray Oscillograph (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98.

A portable, general-purpose, six-trace, cathode-ray oscillograph is described. Eight 2-inch cathode-ray tubes are arranged side by side in a line Six of these tubes have individual d. c. amplifiers, which have high-gain, high-input impedance, good high-frequency response, and excellent stability. The two outside cathode-ray tubes give calibrated timing pulses.

A built-in camera with a fast lens photographs the cathode-ray tubes on andard 35-mm. film to give a continuous time-displacement record of the thode ray spots. The film may be driven past the lens aperture at speeds ntinously variable from a few inches per second to 15 feet per second. A 0-foot film-supply system can be used, or a 10-inch strip can be fastened ound the drive drum for short records.

Film can be processed rapidly and examined readily with a viewer having 5- to 10-diameter magnification. More complete analysis of records can be de from enlargements. - Authors' abs.

ulomb, Jean. Séismes profonds et grandes anomalies négatives de la pesanteur peuvent-ils être attribués à une extension plastique? (Can Deep-Seated Seismic Activity and Large Negative Anomalies of Gravity be Attributed to a Plastic Expansion of the Earth?). Ann. Géophys., Paris, vol. 1, No. 3, 1945, pp. 244-255. (See abs. 8647 in this issue.)

78. Gamburtsev, G. A. On the Significance and Interpretation of Transverse Profiles in Exploration by Seismic Reflection (abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 120-121.

In exploration by seismic reflection, transverse profiles can serve as a ery precise means of detecting the smallest inclination of reflecting horins. Accordingly, an analysis is made of some of the distinctive features of servation over such profiles, and formulae are given for interpreting the dographs obtained. The form of these formulae is found to coincide with hat of the formulae for the interpretation of hodographs of refracted waves. ch identity leads to the conclusion that the inclination of seismic horins can be determined in a number of cases even when it is uncertain whether e records used were made of refracted or reflected waves. (Inst. Theor. ophys., Moscow.) - Transl. by V. S.

79. Gamburtsev, G. A. Methods of Interpreting Isochrone Maps of Refracted Waves (in Russian). Compt. rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 44, No. 7, 1944, pp. 274-276.

The development of the correlation-refraction method and its application areal surveys by means of the isochrone technique pose problems of the atial interpretation of refraction isochrone maps. A particular case is alyzed when the velocities of elastic waves in each layer are constant and own, and when the wave fronts in the lower refracting layer can be considered ertical. This three-dimensional problem is reduced to a combination of mple two-dimensional questions solved by the method of time fields. The stinctive feature of the solutions consists in analyzing cross sections of e time fields and their horizontal projections rather than the total time eld in its entirety. The solution is given in a form convenient for actical application. - V. S.

8680.Gane, P. G., Hales, A. L., and Oliver, H. A. A Seismic Investigation of the Witwatersrand Earth Tremors. Bull. Seismol. Soc. Amer., Berkeley, Calif. vol. 36, No. 2, 1946, pp. 49-80.

The results are presented of an investigation of the foci of Witwatersrand earth tremors by means of five small, mechanical seismographs. Timing accuracy of about 0.05 second was obtained by the use of synchronous electric clocks at each station, the time marks from which were correlated daily by means of radio time signals. The instruments are described, and an account of the locating procedure is given. The average velocities for the area were found to be $V_p = 5.40 \pm 0.07$ km/sec., $V_s = 3.19 \pm 0.03$ km/sec. The energy in a large tremor was estimated to be of the order of 10^{18} ergs. - Authors' abs.

8681.Gilmore, M. H. Microseisms and Ocean Storms. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 36, No. 2, 1946, pp. 89-120.

A direct relationship is found to exist between microseisms and low barometric pressure characterizing storms. In the past, investigations were made in India, Germany, and the United States. During World War II, the United States Navy conducted research on the use of microseisms for locating and tracking severe, far-distant hurricanes.

The first naval station for microseismic detection of hurricanes was established on Cuba in 1944. It employed the tripartite method of observation which determines the direction of disturbance and microseismic amplitudes by measuring time intervals between wave arrivals at three vaults disposed triangularly. The data indicated a high degree of correlation between microseismic activity and intense storms, as well as satisfactory localization of the activity. In 1945 two more tripartite stations were added, in Puerto Rico and Florida, for checks by triangulation. The results are discussed and illustrated by graphs of storm tracks, microseismic amplitudes, and travel-time curves; the formulae for the determination of the direction of arrival of microseisms at a tripartite seismograph station are given. B. Gutenberg, adviser to the Navy Department, reported that the correlation between microseisms and storms appears convincing. - V. S.

8682.Gilmore, M. H. Microseisms Classified According to Type of Storms. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 466-473.

The purpose of this paper is to present certain technical details involved in a proper interpretation of dominant microseisms recorded in the Caribbean. Twelve figures are given that show microseisms produced by hurricanes, cold fronts, thunderstorms, fair weather and artificial vibrations. These are classified and listed in a table according to type, period, amplitude, form, and duration. - Author's abs.

583.Green, C. K. Seismic Sea Wave of April 1, 1946, as Recorded on Tide Gages. Trans. Amer. Geophys. Union, vol. 27, No. 4, 1946, pp. 490-500.

Records from some 20 tide stations in the eastern Pacific Ocean, cover- ng a belt from 57° N. latitude to 33° S. latitude, which show the onset of he seismic sea wave of April 1, 1946, are analyzed. Travel-time curves mputed from the formula $V = \sqrt{gd}$ are shown to be in good agreement with e observed times of arrival of the seismic sea wave. The average ratio of itial rise to succeeding fall of the water is found to be one to three; hich may account for the frequent mention of an initial recession by ewitnesses. The first half period is derived as a measure of the period f the seismic sea wave, which is found to average 15.6 minutes. The period r the nearer stations averages 15.0 minutes, whereas for the farther stations it averages 17.4 minutes. - Author's abs.

584.Heinrich, R. R. Northeastern Ozark Earthquakes. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, pp. 320-323.

In recent years, instrumentally determined epicenters of five earth- hakes have been located on the northeastern flank of the Ozark uplift. The ocal distribution of these epicenters shows (1) the dangers of considering rtheastern Ozark seismic activity as arising from geographically delineated ismic districts, and (2) the importance of discussing the earthquakes in lation to the zone of faults and flexures that lies between the Ozark dome d other major tectonic features to the north and east.

Interesting structural features are found in the vicinity of the epicen- ers of individual earthquakes. The epicenters were situated (1) on the imb of the Eureka, Mo., anticline, (2) adjacent to the faulted Waterloo- upo, Ill., anticline, (3) in the Ste. Genevieve, Mo., fault zone, (4) in he vicinity of the Moselle, Mo., fault, and (5) in the large faulted block uthwest of the magnetic high near Bourbon, Mo. Depth of foci of at least miles is indicated by the distribution of intensities and the character of he seismograms. In this connection, the possible shielding effect of the zark core invites further study. - Author's abs.

585.Hoylman, H. W. Seismograph Evidence on Depth of Salt Column, Moss Bluff Dome, Texas. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 128-134.

Clear reflections, at times of approximately 2.3 and 4.4 seconds, were btained consistently on a series of records shot directly over the shallow ap rock of the Moss Bluff dome. The earlier reflection can be interpreted s from the base of the salt column, at a depth of around 16,000 feet, or rom a discontinuity within the salt column. The later reflection can be nterpreted as from the base of the salt column at around 36,000 feet, from he basement complex at around 26,000 feet, or as a multiple of the reflec- ion from the base of the salt column at around 16,000 feet. Reasons are iven for preferring the multiple reflection interpretation. - Author's abs.

8686. Inglada, Vincente. Tabelle degli intervalli $(t_{pP} - t_{P})$ e $(t_{sS} - t_{S})$ per l'analisi dei terremoti ad ipocentro profondo (Tables of the Intervals $t_{pP} - t_{P}$ and $t_{sS} - t_{S}$ for the Analysis of Earthquakes with a Deep Focus). Geofis. Pura & Appl., Milan, vol. 3, No. 4, 1941, pp. 189-193.

The author has calculated the values of the interval $(t_{pP} - t_{P})$ to the second decimal of a second, using a formula of Berlage. The tabulated result cover earthquakes of a depth of 50 to 800 km. with a focal distance of 200 to 11,400 km.; the data of Gutenberg and Richter served for the computation of $1/v$ and $1/V$. In order to obtain the values of the interval $(t_{sS} - t_{S})$, the figures calculated for $(t_{pP} - t_{P})$ were multiplied by 1.80. The tables are given. - Author's abs., translated by V. S.

8687. Ives, G. O. Colombia Exploratory Activity. Oil Weekly, Houston, Tex., vol. 122, No. 10, 1946, Intern. Sec., pp. 12-15.

Colombia is undergoing extensive exploration by seven oil companies and appears to be entering its period of greatest oil search. Most of the new drilling is based upon geophysical exploration made chiefly by seismic reflection; there were some refraction surveys also. The work centers in various parts of the country, such as the middle ranges of the Magdalena River, Bolivar, etc. Geophysical exploration is very expensive, varying considerably with the localities; to keep a seismic crew operating costs from $50,000 a month upward. - V. S.

8688. Jones, W. M. The Seismic Geometry of a Volcano Such as Ruapehu. New Zealand Jour. Sci. & Tech., Wellington, N. Z., vol. 27B, No. 4, 1946, pp. 317-329.

For a volcano of the size of Ruapehu, the problem of locating the foci of seismic disturbances is discussed. A group of hypothetical stations is used to consider the geometrical principles involved, the layout of stations for particular methods, and the bearings of instrumental performance and initial assumptions on the accuracy attainable. Remarks are made also on the problem of early location of incipient activity of the thermal region. - Author's abs.

8689. Kintz, G. M. Informal Discussion of Explosives Hazards on Seismograph Crews. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 148-163.

This paper sets forth the need for standard instructions in the safe handling and use of explosives in the geophysical industry. It suggests the appointment of an agency, such as the Bureau of Mines, to collect data regarding accidents and near accidents in which explosives were involved, the agency also to analyze the data that are submitted, and to compile from the data a standard set of instructions. Several accidents that occurred hile explosives were being used by the geophysical industry, and which were ported to the Bureau of Mines during the last 5 years, are discussed and nalyzed.

Although the accidents considered were not all of the accidents that ccurred, they cost the industry over $235,000 and the lives of 5 men in ddition to permanent injuries to several members of the geophysical crews. he author believes that if a standardized set of instructions were compiled nd used, most of the explosives accidents could be prevented. Moreover, hese instructions would improve the efficiency of crews when the men are hifted or new men are employed. - Author's abs.

690. Kirnos, D. P., et al. The Bokhara Seismological Expedition (abs., in Russian). Akad. Nauk SSSR, Otd. Fis.-Mat., Referaty za 1943-44, Moscow, 1945, p. 121.

In 1942/43, a seismological expedition made surveys in Bokhara, USSR, o test the local sediments for oil, particularly the Khadzhi-Kab incline. he seismic method of reflection was used, including application of transerse profiles developed during the work. In the interpretation, both the irst and the subsequent arrivals were considered, the latter being correated according to the qualitative features of vibratory patterns.

The results have given indications on the number of reflecting horizons, he values of velocity in different rocks, the characteristics of propagaion in stratified media, etc. They have been confirmed by boring and lotted in structural maps. The delineation of the Khadzhi-Kab incline howed that the previously determined gravitational maximum is removed by 00 to 400 meters from the local dome. (Seismol. Inst., Moscow.) - V. S.

3691. Kölbel, H., Schnell, H., and Trappe, F. Seismische Untersuchungen im Holmstedter Braunkohlenrevier (Seismic Surveys in the Brown-Coal District of Helmstedt). Jahrb. d. Reichsamts für Bodenforsch., 1942, Berlin, vol. 63, 1944, pp. 550-556.

The seismic method can be used to map soft-coal mining operations. A urvey was made in the Helmstedt-Supplingen region, Germany, to clarify the ertiary tectonics of the Helmstedt coal field; the local geology is escribed. The refraction method served for exploration because the depth equired did not exceed several hundred meters. The work was carried out y means of explosions from depths of 15 to 20 meters registered by 6 lectric seismographs separated by 25 to 100 meters; 700 seismograms were btained from 23 shotholes over two main profiles and several transverse rofiles. The results confirmed the existence and delineated the contours f an anticipated salt dome westward from Helmstedt. It was found to be an pthrust linking trough sections of the coal-bearing Tertiary Basin. A eological profile is presented. - V. S.

3692. Kosminskaia, I. P. On the Initial Points of Hodographs of Mintrop Waves (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 10, No. 1, 1946, pp. 91-100.

In 1917, L. Mintrop offered a method of prospecting utilizing the first arrivals of seismic waves propagated at a critical angle $i = \text{arc Sin } \frac{V_1}{V_2}$, the values V_1 and V_2 being velocities in two different media; a drawing gives the relationship between direct, reflected, and Mintrop waves (top waves). The existence of Mintrop waves was later confirmed by numerous field experiments in different countries and by the laboratory tests of O. Schmidt (See Geoph. Abs. 98, No. 5061).

In 1944, Mintrop waves were studied in the course of surveys by the correlation refraction method carried out by the Institute of Theoretical Physics in the Baku region, USSR. The experimental observations are described, with illustration of seismograms of reflected and Mintrop waves. Consideration is given to reconciling these data with existing theories, and to a mathematical determination of average velocity in the covering medium in terms of the coordinates of the initial points of hodographs of Mintrop waves. The errors of such determinations are analyzed. - V. S.

8693. Leet, L. D. Earth Motion From the Atomic Bomb Test. Am. Scientist, New Haven, Conn., vol. 34, No. 2, 1946, pp. 198-211.

Conditions at the test of the atomic bomb in New Mexico on July 16, 1945, have for the first time duplicated experimentally (at a proper energy level) the problem of Lamb in 1904. At that time, he solved equations of elasticity to predict ground motion at a place distant from the point where a vertical impact is applied to the ground. In New Mexico, ground motion was recorded on a damped three-element seismograph with oriented horizontal components. Results differed widely and significantly from prediction. One previously reported wave type, the coupled, not predicted by theory, carried an appreciable portion of the energy in the ground waves. Another, the hydrodynamic, had not been reported or predicted before. It produced the greatest displacements on the record. Longitudinal, transverse body, Rayleigh, and surface shear waves were also identified.

This record represents the most important single advance to date toward the solution of the seismological problem of establishing observationally the types of waves which earth materials in place will support, one of the basic problems in the science. - Author's abs.

8694. Macelwane, J. B. The Problem of Microseisms and Ocean Storms. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 36, No. 2, 1946, pp. 81-82.

The author outlines the problems and origins of the microseismic research on ocean storms conducted by the United States Navy during the war. Generally, microseisms comprise all the various types of waves recorded by seismographs and not due to earthquakes. In investigations of ocean storms, only the group microseisms appearing as a sequence of groupings of regular waves of four to six seconds period, with short intervals of slight motion, are important. Statistical and temporal correlation studies had pointed to three possible explanations of such microseisms during ocean storms; namely, they could originate in the surf on rockbound coasts, or in certain types of frontal disturbances anywhere on land and sea, or else at the center of storm at sea.

The last named explanation was supported by the experimental evidence of J. E. Ramirez in 1939-40, obtained by means of one tripartite recording station with specially designed seismographs suggested by J. B. Macelwane. During the war, the United States Navy made tests in the Caribbean to duplicate the results of Ramirez and to experiment with more than one tripartite station. - V. S.

8695. Martin, Rodrigo. Variaciones laterales de velocidad en la prospeccion sismografica (Lateral Variations of Velocity in Seismographic Prospecting). Bol. Inform. Petrol. (Y.P.F.), Buenos Aires, vol. 22, No. 256, 1945, pp. 444-449.

The application of seismic reflection to exploration for oil is explained briefly. Attention is then centered on the determination of velocities in the deep subsurface layers. The main difficulty here arises from the uncertainty of lateral velocity, which may not be constant. A method making it possible to attribute the most probable velocity values to the horizons investigated is discussed in terms of the data of a seismic survey made near the confluence of the rivers Neuquen and Limay, Argentina. The variation of velocity in this locality was so large that it produced a difference of 130 meters in the determinations of the reflecting horizon at three adjacent stations at depths of the order of 1,300 meters. The solution is worked out by means of a map of isocorrections. - V. S.

Nettleton, L. L. Geophysical History of Typical Mississippi Salt Domes (abs.). Oil & Gas Jour., Tulsa, Okla., vol. 44, No. 48, 1946, p. 98. (See abs. 8655 in this issue.)

8696. Perri, Emilio. Di un nuovo accelerometro e relativo metodo di lettura differenziale per la determinazione rapida delle forze sismiche massimali (Concerning a New Accelerometer and the Related Method of Differential Readings for a Rapid Determination of Maximum Seismic Force). Geofis. Pura & Appl., Milan, vol. 3, No. 1, 1941, pp. 1 - 11.

The author's new accelerometer for seismic determinations is described briefly with regard to construction and theory. It is based upon the pendulum principle and includes a subsidiary apparatus of the frequency-meter type for ascertaining the period of seismic vibrations (see Geoph. Abs. 101, No. 5498). The instrument can be used for determining maximum seismic force by means of a method of direct and rapid differential measurements. Acceleration is read simultaneously on two accelerometers having nearly the same sensitivity but a different pendulum period. The method is explained, and the underlying principles are demonstrated by mathematical discourse. The precision of measurements is found to approximate 5 percent. - V. S.

8697. Reed, Paul. Socony-Vacuum Explores Barinas, Venezuela's Largest Concession. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 14, 1946, pp. 62-63.

Early in 1946, five seismograph parties and one gravimeter party made surveys in the Barinas, Apure, and Tachira concessions of the Socony-Vacuum Oil Co. in Venezuela, which comprise in all 3,339,700 acres. The principal work centered in Barina, Venezuela's largest and least accessible concession; continuous reflection prospecting was done in the vicinity of Yaure. So far, three initial wells have been drilled to depths of 7,000 to 10,000 feet, all dry. Very little geological information is available. Most of the seepages in Barinas seem identified with Eocene formations; the original sources of oil are not known. - V. S.

8698. Riznichenko, Iu. V. On the Relationship Between Layer Velocities, Boundary Velocities, and Average Velocities (abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 124.

In seismic exploration, the basic physical characteristic serving for determining the configuration of geological media is the velocity of propagation of elastic waves. However, measurements yield not the actual value of velocity at any point but certain average values. Such are, particularly, the average velocity of a vertical ray passing between the given depth and the surface and usually employed in the case of horizontal stratification, or else the layer velocity which is the averaged value of the actual velocities that is assigned to the depth zone investigated.

The author determines the mathematical relationships existing between some of the average values employed; namely, between the average velocity, the layer velocity, and the boundary velocity. The latter is the value ascertained by means of hodograph interpretation. The results are discussed, and graphic methods are evolved for determining layer velocities from the data of seismic coring or reflection measurements. (Inst. Theor. Geophys., Moscow.) - Transl. by V. S.

8699. Riznichenko, Iu. V. Contribution to the Development of the Theory of Borehole Seismographs (in Russian). Bull. (Izvestiia) Acad. Sci. URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 11-20.

Mathematical solutions are sought for the direct and reversed problems of seismic prospecting in boreholes. Consideration is given to penetrating and nonpenetrating refracted waves and to Mintrop waves (top waves). The method consists in calculating the relationships between the apparent velocities measured along the borehole axis above and below the investigated horizon as functions of several shot points on the surface.

The formulae deduced make it possible to express the theoretical alternatives for these relationships in the form of diagrams. These can be used for the solution of problems of interpretation by plotting also the empirical data in the form of special diagrams and comparing them with the theoretical diagrams; such a solution is applicable in more problems of interpretation then the solution of A. Datskevich. The theoretical diagrams also may serve for dealing with a number of methodological problems, such as distribution of shot points, compilation of data, determination of errors, etc. - V. S.

8700. Scholte, J. G. On the Stoneley-Wave Equation. Proc. Nederl. Akad. Wet., Amsterdam, vol. 45, No. 2, 1942, pp. 159-164.

The Stoneley wave system can be derived by extending the calculations of Knott relating to the reflection of elastic waves at the surface of separation between two infinite media. The corresponding wave equation is not always solvable, as has been pointed out by Stonely. In the present paper it is shown for what values of the material constants (γ_2/γ_1 and μ_2/μ_1) the equation can be solved. - Author's abs.

8701. Sieberg, August. Processi meccanici nella distruzione degli edifici per azione sismiche (Mechanical Processes in the Destruction of Buildings by Seismic Action). Geofis. Pura & Appl., Milan, vol. 3, No. 3, 1941, pp. 125-141.

It is increasingly believed that earthquake damage to buildings should be studied in terms of seismic action on their foundation and the resulting mechanical processes of destruction. The author has continued such experiments at the Deutsche Reichsanstalt für Erdbebenforschung, Jena (Geoph. Abs. 05, No. 4650). His method, confirmed by observations of actual earthquakes, consisted in subjecting to controlled shocks various models of buildings placed on special platforms resembling shaking tables, while taking records of seismic vibrations and photographing the destruction on moving films. In presenting his results, he discusses the observed deformations and damages, distribution of stress, effects of various types of foundation, and shock-resisting construction. Reproductions of films of the destruction of models illustrate the text. - V. S.

8702. Sprengnether, W. F., Jr. A Description of the Instruments Used to Record Microseisms for the Purpose of Detecting and Tracking Hurricanes. Bull. Seismol. Soc. America, Berkeley, Calif., vol. 36, No. 2, 1946, pp. 83-87.

A horizontal-component seismometer was designed by the Sprengnether Co. for experiments in detecting and tracking hurricanes conducted by the United States Navy during the war. It bears the characteristics of the Macelwane-Sprengnether instrument, with simplified controls and adjustments. Construction consists essentially of three elements - the boom assembly, the coil magnetic unit, and the damping magnetic unit. The maximum synchronous magnification for operating at a period of 6 seconds is about 2,500.

A three-component recorder of the drum type is provided for identical time marks essential in meteorological problems. To avoid confusing overlaps of closely spaced microseism lines of high amplitude, a line-spacing lead screw can be rotated by a motor drive in a direction opposite that of the drum, causing the drum to progress faster along its axis. As a result, it is possible to separate the lines by any required space. The different parts of the seismometer are described and illustrated by photographs. - V. S.

8703.Taylor, J., Morris, G., and Richards, T. The Effect of Velocity of Detonation on the Efficiency of Explosives Used in Seismic Prospecting. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 350-361.

Field tests have shown that no significant difference in amplitude or frequency of the first arrivals of refracted waves at distances of 6,000 to 20,000 feet is found from explosives having velocities of detonation in the range 7,500 to 1,100 metres per second or powers from 61- to 85-percent blasting gelatine. When a deflagrating explosive was employed, there was only a very small decrease in the amplitude of the refracted wave. - Authors' abs.

8704.Wolf, Alfred. Motion of an Elastic Sphere in an Acoustic Wave Field in Fluids. Geophysics, Menasha, Wisconsin, vol. 11, No. 2, 1946, pp. 178-182.

The motion of an elastic sphere in an acoustic wave field in fluids is determined as function of the elastic constants of the sphere, its radius, and the frequency of the wave field. It is found that the motion differs but little from the motion of an infinitely rigid sphere when the wave length of transverse waves in the elastic sphere is at least as long as the circumference of the sphere. The coefficient of zero order scattering potential in the fluid is determined. - Author's abs.

4. ELECTRICAL METHODS

8705.Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Redbank Copper Field, Northern Territory. Report for period ended 31 December, 1940, Canberra, 1942, pp. 60-63.

This field is situated 14 miles west of the Queensland border and 50 miles south of the Gulf of Carpentaria. Potential ratio, electromagnetic, self potential, and magnetic surveys were conducted, and the potential ratio and magnetic methods proved to be the most useful. With the exception of the Azurite and possibly the Redbank lode, the results did not serve to indicate the possible limits of the lodes. The results obtained at the Redbank mine suggest that the lode is of limited length and does not extend far beyond the line of the present working. The Azurite lode appears to be associated with a 400-foot long, well-defined conductive zone which may be due to kaolinization. - Author's abs., Report, p. 8.

8706.Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Croydon Goldfiel, Queensland. Report for period ended 31 December, 1940, Canberra, 1942, pp. 64-69.

This field is situated 85 miles to the east-southeast of Normanton on he Gulf of Carpentaria. The possible presence of a deep lead originating ear the True Blue reef was investigated by the electrical depth-probe method. he results suggest that there is one buried valley near the True Blue reef nd two valleys south thereof. Testing is deemed warranted in the deeper art of the valley near the True Blue reef in order to determine the gold ontent of the material in the bottom of the valley.

Potential ratio surveys were made in three places at the southeastern nd of the field, in which detrital quartz suggested the presence of a quartz eef. In the Moonstone area an intense indication was obtained, and subseuent trenching exposed a narrow quartz vein containing high-grade gold ore n some places. - Author's abs., Report, p. 7.

3707. Anderson, D. M. Electrical Logging - An Aid to Wartime Production. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 11, No. 3, 1945, pp. 17-19.

In the Wilmington oil field of California, at present the second largest roducer in the United States yielding 100,000 barrels a day, the accumulaion and drainage of oil largely depend on an extensive fault system. To tudy its complex configuration, the Lane-Wells Co. has run 1,074 electrologs, overing all the wells of the field.

The results of correlation obtained for the wells on the south side of erminal Island are discussed and shown on a cross section. Four main proucing horizons are revealed in which faulting increases downward. Heavy ertical lines adjoining the logs indicate shales or wet sands that had een excluded from production by a cementing through perforations in multione completions. It is pointed out that an accurate placing of these emented intervals is possible only with the use of electrical logs. Other dvantages are noted. In all, electrical logging in Wilmington field has hown faithfulness to detail, accurate indication of thickness and depth, nd registration of all essential characteristics encountered. - V. S.

3708. Arlick, A. B. Electrical Potential of the Earth's Surface. Current Science, Bangalore, India, vol. 14, No. 6, 1945, p. 151.

The author examines the generally accepted assumptions that the elecrical potential of the earth's surface is a fixed quantity and that the agnitude of this quantity is zero. Existing knowledge appears to contraict them both.

The strength of the core's field is of the order of 10^6 volts per entimeter, whereas the electric field that emerges at the earth's surface s merely a few volts per centimeter. This and other related facts show hat there is an exceedingly steep difference of potential between the under nd the upper surfaces of the crust. Therefore, the electrical potential f the earth's surface with respect to the core must be of a very high order f magnitude and not zero.

Furthermore, the strength of the terrestrial electric field within the arth's crust satisfies the relationship $y = f(q, x)$, whereas the electric potential of the earth's surface satisfies the relationship $\mathcal{P} = 2{,}900$ km. x $\int f(Q)\,dx$, where Q is the earth's charge and x the height of a point on the earth's surface measured from the core's surface. Inasmuch as the value of Q varies directly as the terrestrial electric field, and the latter is known to change from time to time, the electrical potential of the earth's surface P with respect to the core cannot be a fixed quantity. On the contrary, it must vary over a wide range of values in direct proportion to the changing magnitude of the earth's field. - V. S.

8709. Broadhurst, E. Geophysical Prospecting at Moonta and Kadina. Chem. Eng. & Min. Rev., Melbourne, Australia, vol. 38, No. 450, 1946, pp. 197-203.

The areas about the abandoned Wallaroo-Moonta copper mines of South Australia have been surveyed for possible extensions of the exhausted deposits. The pre-Cambrian basement bearing minerals consists of mica-schists and quartzites with intrusions of felspar porphyry and is overlain by Cambrian, Tertiary, and recent deposits. Geophysical exploration of locations selected on geological indications was made in 1928 and in 1942 by electromagnetic method; a highly conductive sheet of clay covering the entire area to a depth of 10 feet and the high salinity of underground water rendered application uncertain. One of the areas also was surveyed magnetically.

The electromagnetic results gave strong indications of lode shear in several places, which are described. Magnetic results also showed a strong anomaly registering up to 6,000 gammas. However, the eight holes drilled revealed no copper ore. Apparently, the indications had been caused by shearing of felspar porphyry and barren quartz lodes. Further drilling is recommended. - V. S.

8710. Coates, G. E. The Principles of Electrolytic Corrosion of Metals. Chem. & Ind., London, No. 35, 1944, pp. 306-309.

A corroding metal may lose its negative charge in several ways: (1) By the discharge of positive ions in solution, commonly hydrogen ions, to form pure hydrogen, (2) by reaction with oxidizing agents forming negative ions, i.e., hydroxyl ions, or (3) by metallic conduction to another electrode at which the processes (1) or (2) may take place. The presence of air or oxygen accelerates the corrosion rate. If the dissolution of iron (the anodic process) and the reaction of electrons with oxygen (the cathodic process) occur at sites well separated, the corrosion product will be loose and no hindrance to further corrosion. If conditions are such that a closely adhering product forms, particularly over the anodic area, the corrosion rate may become very slow.

Over-voltage plays an important role in corrosion rate, i.e., cadmium dissolves very slowly in nonoxidizing acid because of the high hydrogen over-voltage. Hydrogen over-voltage is an important factor in corrosion of aluminum and magnesium. - Corrosion, vol. 1, No. 1, 1945, Abstracts, p. 20.

711.Enslin, J. F. Basins of Decomposition in Igneous Rocks: Their Importance as Underground Water Reservoirs and Their Location by the Electrical Resistivity Method. Trans. Geol. Soc. South Africa, 1943, Johannesburg, vol. 46, 1944, pp. 1-12.

Most of the extractable underground water in igneous formations is tored in the decomposed rock. Basins of decomposition can be located by he electrical resistivity method, and borehole sites can be selected ccordingly. The electrical resistivity instrument and method are described riefly, and their application is illustrated by a discussion of some actual urveys. In addition, some statistics concerning the boreholes drilled in gneous rocks in South Africa are given. - Author's abs.

712.Gilbert, T. H., and Cornfield, Guy. The Behavior of Zinc-Iron Couples in Carbonate Soil. Corrosion, Houston, Tex., vol. 1, No. 4, 1945, pp. 187-191.

To determine the cathodic protection afforded to pipe lines, the U. S. ureau of Standards installed zinc-iron couples at several underground test ites. The paper describes tests in the "highly carbonate" soil near Los ngeles. Each couple consisted of an iron ring connected to one or more inc cylinders; the entire surfaces of the rings were in contact with the oil, whereas the cylinders, being covered by bottomless glass jars, touched he soil with their bases only. Electrode potentials and galvanic currents ere measured periodically during 30 months.

The results indicated that the iron cathodes were not polarized; the urrent decreased toward the end of the tests; the potentials of iron, with espect to a copper-sulfate electrode, ranged between 0.35 and 0.79 volt, hereas those of zinc registered no appreciable change; differences in opencircuit potentials showed a rough correlation with humidity, with voltages ncreasing during the dry season; a coating generated on the zinc anodes educed the current output; and none of the iron cathodes received adequate rotection against corrosion. - V. S.

713.Gilchrist, L., and Britton, J. W. An Improved Arrangement of the Single-Current Line Electrode Method of Geophysical Investigation (abs.). Trans. Roy. Soc. Canada, Ottawa, 3d ser., vol. 38, 1944, List and Minutes, p. 147.

This is a modification of the central line electrode method of exploraion. It serves for distinguishing the anomalous resistivities at the surace and at depth more readily than by other electrical methods of exploraion.

714.Lee, F. W., and Hemberger, S. J. A Study of Fault Determinations by Geophysical Methods in the Fluorspar Areas of Western Kentucky. U. S. Bureau of Mines Report of Investigations 3889, June 1946, 27 pp.

Electrical-resistivity surveys were made in the fluorspar mining areas near Marion, Kentucky, previously investigated geologically by S. Weller and others. The work was undertaken to determine the mines' mineral trends, particularly in relation to the fault patterns, and to compare the geophysical and geological results.

The report outlines the local geology, geophysical principles of fault detection, electrical resistivity methods with their applications and problems, and the results obtained geophysically and geologically. Consideration is devoted to the charting of fault anomalies, conditions modifying interpretation, comparisons of resistivity in different portions of the ground, resistivity differentiation of changes in homogeneity, separate resistivity functions in fault location, determination of average ground resistivity, study of topographic elevations, etc.

The results point to a substantial identity of geological and geophysical findings and to the advantages of preliminary geological information. They also reveal many additional fault locations, further complexities of structure in deeply-weathered zones, and more complete data on areas with minor faulting not detected geologically. Conclusions are drawn as to the character of mineralization.

As regards electrical resistivity methods, it is found that traverses should not be set farther apart than 200 feet, the 4-electrode system locates only the faults registering abrupt changes, a differentiation based upon asymmetry is very sensitive, and the local faulted area proves very diverse and complex electrically. Charting the results on profiles mounted on an areal map is recommended, and numerous profiles, maps, cross sections, and diagrams are presented. (A review appeared in Mining World, London, vol. 151, No. 3,936, 1946, p. 145.) - V. S.

8715. Mining Record, Denver, Colo. Fisher Research Using New M-Scope at Whitlock Mine. Vol. 56, No. 49, 1945, p. 3.

A geophysical survey of the Whitlock mine area, Mariposa County, California, leased to the Fisher Research Laboratory for experimental geophysical surveys with Fisher Laboratory instruments, is being conducted by Charles Dobbel, who employs a new M-scope designed as a modification of a radar set used by the United States Signal Corp. Following the geophysical survey a follow-up with a bulldozer is planned. - V. S.

8716. Nikiforov, N. A. Geophysical Methods as Means of Detecting and Studying Gold Deposits (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 4, 1945, pp. 389-398.

Magnetic and electrical methods were applied for exploring gold deposits in the Trans-Baikal and Ural regions of USSR. The favorable results obtained appear to justify recommending these methods for gold prospecting and intensive study of related deep-lying formations. Three examples of exploration are described.

1. The magnetic exploration of a Trans-Baikal gold deposit dealt with partly metallic sulfide and quartz-sulfide veins imbedded in crystalline

rmations. Measurements of the vertical magnetic component gave a distinct fferentiation of geological elements: syenites and gabbro-diorites regis- ered high positive readings, and granodiorites and diorites gave low readings. me sulfide beds produced the lowest readings. Evidence was found of two ins, as illustrated by the appended isogam map.

2. The natural-potential survey of the same deposit also yielded high ological differentiation. Such measurements were possible because of the ocesses of restorative oxygenation, which occur in and about sulfide veins d usually produce distinct electrical polarization. The differentiation s due to variations in sulfide content, tectonic processes, and microtec- nics. Actual correspondence between anomalies and veins has been checked y some boring. The anomalies detected are discussed and shown on an iso- tential map. A 200- by 40-meter density of observations is recommended for rveys.

3. Another natural-potential survey was made in the southern Urals. t had to do with gold-bearing quartz veins and quartz-sericite-chlorite enses imbedded in a narrow strip of carbon-graphite slates detected in rmations of modified clay, sericite clay, chlorite, and mica. The survey howed that carbon-graphite slates registered potentials of high intensity. he results are plotted in an isopotential map. The author concludes from he total evidence that electrical and magnetic methods can be used for the xploration of gold deposits. - V. S.

717.Phelps, H. S., and Kahn, F. Galvanic Corrosiveness of Soil Waters. Elec. Eng., New York, vol. 64, April 1945, p. 156.

Data are presented on the electrode potentials and polarization charac- eristics of copper, lead, iron, and carbon in soil waters that vary in pH rom 2 to 12. The following tentative conclusions are drawn: (1) Galvanic orrosiveness on lead, copper, and iron appears generally more severe for oil waters of low pH than for those of high pH. (2) Indications are that he static potentials of lead and iron are virtually constant in soil lectrolytes of pH up to approximately 10; as pH is increased above 10, lead ecomes more negative and iron more positive. The potential of copper ecomes more negative in substantially straight-line relation with increasing H. Carbon potentials appear to be virtually independent of pH. (3) For lectrodes of lead, copper, iron and carbon in soil waters, the relation of egree of polarization to pH of electrolyte seems to show definite trends. - orrosion, vol. 1, No. 3, 1945, Abstracts, p. 22.

718.Poldini, Edouard. Quelque considérations sur l'interprétation géophysique (Certain Considerations Relative to Geophysical Interpretation). Bull. Lab. Géol., Mineral., Géophys., Musée Géol. Univ. Lausanne, Switzerland, No. 79, 1944, 8 pp.

A problem in electrical prospecting solvable graphically was submitted o seven persons - geophysicists, geologists, engineers, and technicians - n order to determine the extent to which a subterranean relief can be reconstructed on the basis of electrical measurements. Each person received only a blank sheet with values of apparent resistivity inscribed over a net of stations having a certain minimum density. The invitation was to draw the corresponding contour lines of equal resistivity and to give a geological interpretation. The relief had been taken from the topographic map of the region of Verdun, France, and could be regarded as composed of an electrically conductive layer of variable thickness resting on an infinitely resistive basement. The net of stations was one-third as dense as demanded by the theoretical requirements on density with a view to meeting practicable costs. The geological problem and the method of resistivity prospecting are discussed, partly in mathematical terms.

The seven contour maps offered as solutions and a map of the true relief show that the three maps drawn by geologically competent men approach the correct solution closely whereas the other maps drawn by engineers, technicians, and one geologist deviate from it widely. The different answers are analyzed for the causes of error. - V. S.

8719. Vargas, M: Nota sobre prospeccao geofisica pelo metodo das resistividades (Note on Geophysical Prospecting by the Electrical Resistivity Method). Bol., Depart. Estr. Rodag., Sao Paulo, Brazil, vol. 7, No. 23, 1941, pp. 149-160.

General discussion of method, interpretation, and application. Three examples are presented of surveys executed by the Soils Section of Institudo de Pesquisas Technologicas with a purely experimental purpose. Conclusion as to efficiency and low cost of method are made in the light of a comparison with borehole drilling. - Engineering Index, 1941, p. 533.

8720. Willman, H. B., Reynolds, R. R., and Herbert, Paul, Jr. Geological Aspects of Prospecting and Areas for Prospecting in the Zinc-Lead District of Northwestern Illinois. Illinois Geol. Surv., Urbana, Rep. Invest. 116, 1946, 48 pp.

In northwestern Illinois, commercial deposits of zinc have been found in the area of Galena, Jo Daviess County. Conditions here prove unfavorable to exploration because outcrops are insignificant, drilling records unavailable, and geophysical methods unsuccessful; the local geology is described. However, some results were achieved with the self-potential method over mineralized zones of considerable thickness, where the top is above groundwater level but less than 100 feet deep. Still, interpretation is difficult because the patterns obtained by self-potential mapping are influenced by variations in soil composition and moisture, topography, depth of bedrock, character of basement formations, nature of ore bodies, and other factors. Therefore, only a few of the detected anomalies may be related to mineralization. Further research is deemed necessary to develop successful methods of prospecting for minerals. - V. S.

5. RADIOACTIVE METHODS

721.Campbell, J. L. P., and Winter, A. B. A Review of General Notes on Radioactivity Well-Log Interpretation. Tomorrow's Tools - Today, Los Angeles, vol. 12, No. 2, 1946, pp. 21-24.

The wide use of radioactivity logs in recent years has led to an accumulation of comprehensive data on their interpretation, rendering a systemaized summary desirable. The general material, presented in tables and graphs, elates to physical borehole conditions, contamination with radioactive ubstances, such as silt, bentonite, volcanic ash, etc., determination of rue thickness of a sandstone or limestone zone on a gamma-ray log, and corelation with electrical logs. The more particular information consists of 0 basic items regarding the responses of gamma-ray and neutron curves to ypical formation characteristics. - V. S.

722.Condon, E. U., and Curtiss, L. F. New Units for the Measurement of Radioactivity. Rev. Sci. Instrum., Lancaster, Pa., vol. 17, No. 6, 1946, p. 249.

The United States Bureau of Standards, at the suggestion of the National esearch Council, recommends the adoption of new units for the measurement of adioactivity. The curie, currently in use, can only represent the disinteration rate of radium, or its products, in equilibrium. In measuring the trength of radioactive sources, however, it is necessary to measure the isintegration rate dependent upon the decay constant and the number of atoms f the radioactive isotope in the source. This is simply a number that can e most conveniently expressed in units of 10^6 disintegrations per second, nder the designation "rutherford", abbreviated "rd". The microrutherford ould then be one disintegration per second. Such a unit eliminates the eed of measuring radio-isotopes solely in terms of a standard and opens the ay to other methods.

The elimination of the curie makes it also necessary to adopt for the easurement of gamma-ray sources the unit roentgen-per-hour at one meter, bbreviated as r.h.m., which has a gamma-ray strength 1.18 times that of 1 urie of radium. - V. S.

723.Good, W., Kip, A., and Brown, S. Design of Beta-Ray and Gamma-Ray Geiger-Müller Counters. Rev. Sci. Instrum., Lancaster, Pa., vol. 17, No. 7, 1946, pp. 262-265.

Every laboratory working in the field of radioactivity develops many ypes of Geiger-Müller counters. From time to time, different groups have ublished descriptions of well-tested examples of counters, which have met ertain requirements with particular success. This paper describes three ypes of counters that have proved particularly useful in this laboratory. hese are the mica window, bell-type beta counter, a modified bell counter sed as an X-ray counter, and a high-sensitivity bismuth-screen gamma counter f conventional design. - Authors' abs. (A report from the Physics Laboratory, assachusetts Institute of Technology. - V. S.)

8724.Gorshkov, G. V., Grammakov, A. G., Starik, I. E., and Shpak, V. A. Some Data on the Physical Foundations of Radioactive Geophysical Methods of Exploration (in Russian). Intern. Geol. Congr., Report of the 17th Sess., 1937, Moscow, vol. 4, 1940, pp. 495-497.

Radioactive methods of exploration fall into three groups measuring, respectively, radiations, emanations, and air saturation and ionization. These are described briefly and appraised. Attention is devoted to the use of alpha, beta, and gamma rays. The coefficients of the diffusion of radioactive emanation in rocks are found to vary within the limits of (6.5 - 1.0) 10^{-2} cm. ^{2}/sec., according to the nature and condition of the rocks. The emanation potency of the minerals investigated varies from 0.07 to 98.5 percent. Other results of measurements are given. It is concluded that a knowledge of the emanation properties of rocks is essential for the interpretation of radioactive logging and surveying data. - V. S.

8725.Lorenz, E., Weikel, J., and Norton, S. Counting Rate and Frequency Meter. Rev. Sci. Instrum., Lancaster, Pa., vol. 17, No. 7, 1946, pp. 276-279.

A counting rate and frequency-meter circuit using a thyratron as pulse-leveling device is described. It is characterized by its simplicity and its high resolving power of approximately 1 x 10^{-5} second for evenly spaced pulses. - Authors' abs.

8726.Mercier, V. J. Interpretation of Radioactivity Logs. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 12, No. 1, 1946, pp. 12-19, 31.

Utilization of subsequent data has proved the accuracy of interpretation made from gamma ray and neutron curves. Both curves are discussed and the value of their combined use is demonstrated. - Author's abs.

8727.Oil News, Albuquerque, N. Mex. Atomic Energy May Revolutionize Oil-Locating Methods. Vol. 22, No. 1, 1946, p. 2.

I. A. Berger, C. W. Sheppard, and V. Burton, M.I.T., offer laboratory evidence that crude oil is formed by a radioactive transformation of organic substances under atomic bombardment in the earth. They have turned fatty acids isolated from ocean-bottom mud into oil-type hydrocarbons by subjecting them to bombardment in a cyclotron. Radon, a gas formed by the spontaneous disintegration of radium, was used as the source of alpha particles. In the earth, the atomic energy would be provided by the radioactivity of various minerals. If this hypothesis proves correct, prospecting instruments tracing intense radioactivity in the subsurface could serve for detecting oil deposits. (See also Oil & Gas Jour., vol. 44, No. 49, p. 60). - V. S.

728.Polkanov, A. A., and Gerling, E. K. An Absolute Time Scale for the History of the Earth (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géol., No. 2, 1946, pp. 29-38.

In the present paper the authors discuss the application of lead and
elium methods of age determination to the plotting of an absolute time scale
or the geological history of the earth. Instructions are given regarding
he choice of minerals to be gathered for a determination by the helium
ethod. - Authors' abs.

729.Walker, J. M., and McGaha, S. W. Full Knowledge of Well Conditions Aids in Radioactivity Well-Logging Operations. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 12, No. 2, 1946, pp. 14-16.

Radioactivity logs serve for correcting, confirming, and amplifying
nformation on oil wells gained by other means. In turn, logging operations
re aided by advance study of all the information available. Particularly
seful is knowledge of logging instruments, physical characteristics of the
ell, and local geology. The casing program of the well should be known,
ecause radioactive curves are affected by aluminum and magnesium pipes,
lastics for plug-back or squeezing, contaminating radioactive material, and
nitroglycerin shot-hole width; both the logging procedure and the interpre-
ation of logs have to be adjusted to these particulars. For suspending
ogging equipment in a well, a derrick supplied with a special lubricator is
ecommended. Other items of tested practice are listed. A sample of a
tandard log heading illustrates the text. - V. S.

alker, R. C. Electronic Equipment and Accessories. Chem. Pub. Co., Brooklyn, N. Y., 1945, 393 pp. Price, $6. (This book has a chapter on impulse counting; see abs. 8753 in this issue.)

6. GEOTHERMAL METHODS

730.Flugge-de Smidt, R. A. H. The Measurement of the Geothermic Gradient by Means of the Clinical Thermometer. Jour. Chem., Met. & Min. Soc. South Africa, Johannesburg, vol. 45, Nos. 7-8, 1945, pp. 105-127.

The writer measured the geothermal gradient in a working mine on Rand
eases, Witwatersrand, with a view to determining the temperatures encountered
own to a depth of 9,000 feet. The previous observations in Crown mines
uggested the method adopted. Clinical thermometers were lowered on a frame
f duoced hardwood to a depth of 4,000 feet. The thermometers were kept
rozen before and after use, and packed with crushed ice in their recesses in
he frame; the frame itself also was cooled. The method's advantages, proce-
ures, corrections, precision, observations, and curves of results are

described, and the findings analyzed in the light of theoretical considerations. The temperatures obtained fitted an equation of second degree: $T = 64.96 + 30.305r + 0.181r^2$, where r is the depth in thousands of feet. For 8,000 feet, the temperature would take the value of 103° ± 2° F, if it continued to increase with the same regularity. Comments by J. P. Rees follow (pp. 137-141). (See also abs. 8732 in this issue and Geoph. Abs. 125, No. 8566. A summary appeared in Chem. Eng. & Min. Rev., vol. 38, No. 445, 1945, pp. 23-24.) - V. S.

8731. Grim, R. E., and Rowland, R. A. Differential Thermal Analysis of Clays and Shales, a Control and Prospecting Method. Illinois Geological Survey, Urbana, Ill., Rep. Invest. 96, 1944, 23 pp.

The differential thermal method, by determining the thermal reactions undergone by a clay or shale, is a rapid means of identifying the mineral components and properties of such materials. Analyses are here presented for sequences of samples from the pits of several operating clay plants in order to illustrate the way in which the method can be applied in prospecting and in plant control. Analyses are also given for the pure forms and synthetic mixtures of the common components of clays and shales and for a variety of well-known types of clays. - Author's abs.; abridged by V. S.

8732. Weiss, Oscar. Temperature Measurements in a Mine on the Witwatersrand with an Electrical Resistance Thermometer. Jour. Chem., Met. & Min. Soc., South Africa, Johannesburg, vol. 45, Nos. 7-8, 1945, pp. 127-141.

The author and Flugge-de Smidt made parallel but independent thermal surveys on Rand Leases, Witwatersrand, to prognosticate temperature at the depth of 9,000 feet (see also abs. 8730). The author used a platinum resistance thermometer in which electrical resistance changed according to Callender's equation; measurements had a precision within 0.1° F. This thermometer was lowered into boreholes at the end of wooden rods screwed together, and wire connections with a Callender-Griffith bridge gave immediate temperature readings at the surface. Altogether, about 250 points were measured in 17 boreholes.

The temperatures obtained are tabulated, plotted, and discussed. They show inordinate thermal anomalies and instabilities, a prolonged effect of drilling, and a possible influence of the dip of strata; corresponding recommendations are made relative to further measurements. The temperature curve approximates a straight line and permits the prediction of the values sought by the investigator: 91.7° F. at 6,000 feet, 96.4° F. at 7,000 feet, and 101.3° F. at 8,000 feet. This prediction virtually coincides with that of Flugge-de Smith. In the accompanying comment, J. P. Rees compares the two methods. - V. S.

7. GEOCHEMICAL METHODS

733.Bronston, Allen. Newer Phases in Geochemical Technique. Oil Weekly, Houston, Tex., vol. 119, No. 9, 1945, pp. 56-58.

Field studies have been made recently in Pottawatomie and Seminole ounties, Oklahoma, on geochemical detection of subsurface oil and gas. Soil amples free of vegetative matter were collected at depths of 5 to 150 feet n a series of holes bored at regular intervals. They underwent analyses for he content of solid, liquid, and gaseous hydrocarbons; techniques are escribed. The data of chemical extraction served for plotting curves of ydrocarbon concentration for depths of 5, 50, and 100 feet.

The profiles show that hydrocarbon diffusion, effusion, and permeation hrough the covers of reservoirs have both a qualitative and a quantitative egularity. Certain relationships can also be detected between the types of eservoirs and the hydrocarbon concentration and distribution in the overlying strata. It is noted that shallow samples can lead to false conclusions, hereas those from a depth of 100 feet point to the existence of an oil eservoir. - V. S.

734.Campbell, O. E. The Fluorographic Method of Petroleum Exploration. World Petrol., New York, vol. 17, No. 3, 1946, pp. 54-56.

Fluorescence is a measurable property of the earth significantly related o the occurrence of oil. Its value in exploration has been demonstrated by urveys in Texas and Mississippi. The fluorographic method employed consisted in measuring the fluorescent intensities of surface and subsurface amples and plotting contour maps and fluorologs (U. S. Patent 2,356,454).

In a surface survey, earth samples of 1 ounce are collected at a depth f 2 feet over grids having intervals of 0.12 to 0.25 mile and covering reas of 25 square miles. These samples are then exposed to ultraviolet ays in the fluorograph apparatus for photographing their fluorescence, and he density of each image is measured by a transmission photmeter to determine its fluorescent intensity. The data obtained serve for plotting sofluor maps. The geological interpretation of fluorescent anomalies is iscussed and illustrated by maps.

In logging operations, samples are collected at intervals of 10 to 20 eet and analyzed for fixed and free fluorescence emitted by their solid aterials and free oil and gas. A fluorolog shows four curves: (a) Two urves of the fixed and free data for original and composite samples, and (b) two curves of progressive average fluorescent intensity, fixed and free, t different depths of the well. Samples of fluorologs are shown and their urves are interpreted. - V. S.

735.Pirson, S. J. Emanometric Oil and Gas Prospecting. Petrol. Eng., Dallas, Tex., vol. 17, No. 4, 1946, pp. 132-142.

The emanometric prospecting technique endeavors to measure the absolute emanation per unit area of the earth's crust for one or more gases of diagnostic value in order to detect commercial oil or gas accumulations. Different pieces of evidence point to the existence of micro seepages, but various objections have been raised. For example, methane is formed from decaying vegetation and cannot be used as a reliable indicator of the occurrence of subterranean oil and gas accumulations.

Ethane is believed to be a satisfactory indicator; higher hydrocarbons also could be employed, but their rates of diffusion are lower. The observed rates of emanation of ethane are of the same order as those predicted on the assumption that the formations show an over-all permeability of 10^{-7} darcy. In the field, the emanations are collected by adsorber tubes, which are then taken to a laboratory for degassing, fractionation, and identification of the diagnostic gases. - G. D. H., Jour. Inst. Petrol., vol. 32, No. 271, 1946, pp. 197A-198A; abridged by V. S.

8. UNCLASSIFIED GEOPHYSICAL SUBJECTS

8736. American Geophysical Union. Supplementary Information Relating to Education in Geophysics. Transactions, Washington, D. C., vol. 27, No. 4, 1946, pp. 614-617.

The tabulation of courses offered in American colleges and universities is brought to completion (for pt. 1 see Geoph. Abs. 125, No. 8574). This information furnishes guidance to students of geophysics in choosing schools, but it must be further amplified by consulting the catalogues and authorities of the schools. The American Geophysical Union (5241 Broad Branch Road, N. W., Washington 15, D. C.) offers aid with regard to specific questions. - V. S.

8737. Barsch, Otto. Aufgaben der angewandten Geophysik in Grossdeutschland und im östlichen europaischen Raum (Problems of Applied Geophysics in Wider Germany and Eastern Europe). Jahrb. d. Reichsamts für Bodenforsch., 1942, Berlin, vol. 63, 1944, pp. 682-780.

The author presents an account of geophysical exploration in Germany and the USSR prepared in collaboration with H. Reich, R. Zwerger, H. Closs, and others. The text covers primarily gravimetric, seismic, electrical, magnetic, and radioactive investigations. It deals with principles, procedures, instruments, geologic interpretation, and practical examples illustrated by numerous maps, profiles, graphs, and diagrams; particular attention is devoted to the gravimetric method. Problems of effective exploration of German territories are analyzed, the greatest promise being found in the eastern and northwestern regions; still greater possibilities are believed to exist in the USSR. Suitable geophysical approaches are discussed. A bibliography is appended. - V. S.

8738. Belote, E. S. Adjustment of Traverse. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, p. 307-315.

This paper outlines a method of relating the corrections to the measured distances and the corrections to the observed angles in the adjustment of traverse to achieve a fit with the fixed data with the least distortion. The method is flexible enough to meet the needs of various types of problems. Although it does not give absolute results, it should prove very satisfactory if used with judgment. - Author's abs.

8739. Cortes, H. C. Publication of Geophysical Case Histories. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 287-291.

The Society of Exploration Geophysicists has authorized publication of a collection of geophysical case histories. A series of volumes is contemplated, and the cooperation of members requested. Suggestions are made as to how to safeguard information desired withheld by companies and to insure legal protection for it. - V. S.

8740. Ewing, Maurice. Training for Research in Geophysical Borderlands of Geology. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 553-554.

Training for geophysical exploration necessarily must cover a wide range of subjects, particularly in the basic sciences of mathematics, physics, geology, chemistry, and biology. This can be achieved within the ordinary curriculum of the colleges only by early specialization. In order that a prospective student of applied geophysics may begin to take the proper electives in his undergraduate studies and even in high school, he should have the guidance of his eventual teachers of graduate courses. Professors of geophysics and geology will have optimally prepared classes if they form contacts with promising students in the lower schools and in colleges. - V. S.

8741. Ewing, M., and Woollard, G. P. Recent Geophysical Investigations in the Atlantic Ocean Basin (abs.). Econ. Geol., Lancaster, Pa., vol. 40, No. 8, 1945, p. 590.

During the war, the cooperation of geophysicists, submarine geologists, and oceanographers with the Navy's research program was particularly close and effective. It led to improvements in the methods of both deep-sea and shallow-water seismic surveys, to advances in the techniques of underwater photography, and to the development of other rapid systems for collecting information about the sediments. Some examples of the results achieved by investigators working at the Woods Hole Oceanographic Institution are presented.

As an example of an entirely new tool for the exploration of ocean basins, a method of acoustically scanning the floor of the deep ocean is explained. This method is particularly promising for the location of active submarine volcanoes and isolated submerged mountains which cannot easily be found by conventional sounding techniques. - Abridged by V. S.

8742.Gabriel, V. G. Electronics in the Petroleum Industry. Petrol. Eng., Dallas, Tex., vol. 17, No. 9, 1946, pp. 107-118.

Electronics can be defined as a branch of science that comprises the phenomena observed in passing conduction currents through vacuum or gases, as well as the devices based upon them. Electronic devices play an important part in seismic and in some of the electrical prospecting methods. The usefulness of electronics in gravimetric, magnetic, and other geophysical techniques is also well-marked. The accompanying chart gives an approximate picture illustrating the application of electronics in the petroleum industry. - Author's abs., abridged by V. S.

8743.Gayer, R. B. Mechanical Aids to Prospecting. Western Miner, Vancouver, B. C., vol. 19, No. 6, 1946, pp. 44-48.

In British Columbia, prospectors for minerals must avail themselves of modern scientific and mechanical aids if they are to compete with large companies. Such aids include geophysical instruments, airplanes, helicopters, aerial photography, dropping of supplies, portable drills, bulldozers, mechanical gold pans, etc.; their application in prospecting is described. The helicopter enables a prospecting crew to hover over mineral areas at a desired elevation, study the terrain in detail, and then alight at the points of interest to analyze samples; other advantages are indicated and costs are discussed. The usefulness of aerial photography is stressed. - V. S.

8744.Guyod, Hubert. Well-Logging Methods Studied at Texas A & M. Petrol. Eng., Dallas, Tex., vol. 17, No. 7, 1946, p. 218.

The Engineering Department of the A & M College of Texas gave a refresher course of 12 lectures in well logging for students and returning servicemen. The subjects discussed covered general problems of logs, radioactivity logging, electrical logging, permeability logging, geochemical logging, temperature logging, and other approaches. A classification of logging methods and the properties investigated by them is presented, with remarks on the principles of radioactivity and permeability logging. - V. S.

8745.Krug, J. A. Development of Oil and Gas on the Public Domain. U. S. Senate, Committee On Public Lands and Surveys, 2d session, S. 1,236, pt. 2, 1946, Washington, D. C., pp. 231-252.

In testifying before the U. S. Senate Committee on Public Lands and Surveys as regards S. 1,236, a bill to promote the development of oil and gas on the public domain, the Secretary of the Interior expressed agreement ith provisions for encouraging geophysical prospecting and stressed the need or furthering geological exploration as well: "I am for the United States overnment doing everything in its power to encourage the search for oil eserves. I think that the discovery of new oil reserves and the conservation f those we have are two of the Government's most important responsibilities, nd that industry should be encouraged in every possible way." - V. S.

746. Lisiutin, A. Ia. On the Propagation Velocity of Sound in Oil Wells (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géogr. Géophys., vol. 9, No. 1, 1945, pp. 40-49.

In 1943, echo-metric (sonic) surveys were made in the oil wells of the shimbai region, USSR, by means of the tube of Kundt, the echo-lead, and ound reflectors. The empirical results are analyzed for the different ethods employed, mathematical equations are deduced for the velocity of ound in gas media dependent upon certain geophysical and geometrical parameters, and statistical procedures for the treatment of echo-metric data are iscussed. It is found empirically and theoretically that the velocity of ound does not change perceptibly throughout the depth of oil wells in the shimbai region; its value is consistently 306 m/sec. Therefore, placing ound reflectors at great depth in sonic surveys is unnecessary. - V. S.

747. Mackay, D. K., and Sanders, J. W. Oil and Gas Development in Arkansas in 1945. Am. Inst. Min. & Metal. Eng., Statistics of Oil and Gas Development, 1945 (1946), pp. 1-20.

The production of oil and gas in Arkansas generally is confined to two istinct and widely separated regions - South Arkansas in the Gulf coastal lain and northwest Arkansas in the Arkansas Valley. Exploration during 1945 entered largely in these two producing regions, but some of the geophysical surveys were made a considerable distance outside of them. Geophysical work ncreased from 164 crew weeks in 1944 to 286 crew weeks in 1945, divided as ollows: 161 seismic, 92 gravimetric, and 33 magnetometric crew weeks; their istribution by counties is shown on a map. - V. S.

748. Rosaire, E. E. The Premium Technological Discovery of Petroleum. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 335-349.

Premium technological discovery volume is that achieved in excess of the olume to be anticipated on the basis of price alone and which can be attributed solely to technological advance. Three degrees of freedom - area, ethod, and objective - are recognized for the prospector, and these are fixed y choice in any prospecting venture. Continued operation with these three egrees fixed inevitably leads to diminishing returns and finally to marginal perations wherein price becomes the primary motivation.

Considerations are presented for a return to premium technological discovery within the United States. Such a return for the method now in most general use, the reflection seismograph, can be expected to follow from unfixing the area degree of freedom through initiating prospecting along the continental shelf. However, such a return for prospecting as a whole, and probably of even greater magnitude, can be anticipated to result from unfixing the method degree of freedom through widespread application of novelty in prospecting methods. - Author's abs.; abridged by V. S.

8749. Rothé, Edmont. Questions actuelles de géophysique théorique et appliquée (The Present Problems of Theoretical and Applied Geophysics). Gauthiers-Villars, Paris, 1943, 427 pp.

This exposition of theoretical and applied geophysics embodies the material presented by the author to his classes. Particular attention is devoted to the latest researches and theories. The chapters deal with the province of geophysics, gravity and weight, gravity anomalies on the globe, new methods of gravitational studies, gravimeters and balances, isostasy and cleavages, radioactivity in the earth's crust, volcanism, seismology, and terrestrial magnetism. The treatment is calculated to suggest the lines of further development of geophysics. - V. S.

8750. Standard of California. Finding Oil by Science. San Francisco, Calif., vol. 32, Spring Bull., 1945, pp. 2-3.

The essentials of the methods of gravimetric, magnetic, and seismic oil exploration are stated briefly, and the difficulties encountered in virgin country are indicated. The geological and geophysical surveys of the California Co. have covered 83 million acres in the past 4 years. - V. S.

8751. Van Tuyl, F. M., et al. Developments in Geophysics (1945). Quart. Colorado Sch. Mines, Golden, Colo., vol. 41, No. 3, 1946, pp. 52-67; also pp. 22-37, 68-71, 77-128, 145-203.

This account of geophysical developments during 1945 consists of reviews of some 60 representative papers of the year. It covers explorational statistics, principal trends, technical advances, logging of wells, contributions to regional geology, and the postwar outlook. Independent accompanying sections are devoted to geochemical prospecting, developments in the training of geophysicists and geologists, fluorescence and spectroscopy, geological maps and publications, aerial photography, and other related subjects. A novel feature is a brief outline of exploration and development in Africa, Asia, Australia, New Zealand, Europe, North America, West Indies, and South America. A bibliography is appended. (See also abs. 8774 in this issue). - V. S.

8752. Ver Wiebe, W. A. Exploration for Oil and Gas in Western Kansas During 1944. Geol. Surv. of Kansas, Lawrence, Bull. 56, 1945, 112 pp.

Exploration for oil and gas in Kansas reached an all-time peak in 1944. Extensive geophysical work was carried on, and partly on the basis of it 53 new oil or gas pools were discovered. - V. S.

3753.Walker, R. C. Electronic Equipment and Accessories. Chemical Pub. Co., New York, 1945, 393 pp. Price, $6.

Intended chiefly for "practical engineers, mechanics, students, and other readers who at least have acquired the elements of electricity and magnetism, but who are not specialists in the use or design of electronic apparatus," this book presents an introduction to the principal aspects of electronics and describes the devices and accessory equipment now in use in industry. The opening chapter deals with the fundamental characteristics of thermionic valves, and there follow among the other 14 chapters such titles as "Amplification of Steady and Low-frequency Voltages," "Gas-filled Valves," "Light-sensitive Devices," "The Cathode-ray Tube: Fundamental Principles," "Miscellaneous Electronic Devices: Small Switch-gear," "Impulse Recording or Counting," and "Miscellaneous Circuit Accessories." - Mines Mag., vol. 36, No. 5, 1946, p. 201.

3754.Williams, David. Mineral Resources of the World. The Advancement of Science, London, vol. 3, No. 10, 1945, pp. 206-221.

In reviewing the mineral resources of the world, the author dwells briefly on methods of their discovery. He takes the view that only a few more great mineral districts may yet be found by surface geology, as were the Witwatersrand gold, the nickel of Ontario, the iron of Brazil, or the copper of Rhodesia in the past. The discoveries of the future will come increasingly from deep exploration by geophysical methods. The conditions for successful work by these methods are outlined, the magnetic, electrical, and electromagnetic approaches to the search for metals are discussed, and the present limitations necessitating further research are indicated. - V. S.

3755.Wilson, R. E. The Petroleum Industry's Real Reserve - Technology. Min. Mag., Denver, Colo., vol. 36, No. 5, 1946, pp. 187-191, 200.

This review of petroleum technology includes a section on geophysical exploration. The gravimetric, magnetic, seismic, and electrical-logging methods are explained briefly and their precision is indicated. The gravimeter records the elongation of a millionth of an inch in a spring supporting a weight; corrections are made for altitude changes of as little as 1 foot and for humidity changes affecting the buoyancy of the air. The seismograph measures the electric current produced in a coil of wire when a magnet suspended in this coil moves only one ten-millionth of an inch.

Such precision of measurements is essential in exploration, because relatively little oil has been discovered in the United States so far - less than 2 cubic miles in volume. The greatest contribution was made by the seismic method. During the past decade, seismic surveys accounted for nearly three-quarters of the new oil fields discovered. - V. S.

3756.World Petroleum. Geological Surveys are Planned for Continental Shelf. New York, vol. 16, No. 12, 1945, p. 65.

After the introduction of new legislation in the United States, the United States Geological Survey has been asked to make recommendations for a survey of the submerged floor of the continental shelf, an area exceeding 750,000 square miles. Seismic surveys can be made, and magnetic surveys are possible by means of aeroplanes. Submarines could carry out gravimetric surveys. The three most promising areas are the cost of the Gulf of Mexico, the Pacific coast, and the Alaskan region.

The shelf is taken to be the area covered with not more than 600 feet of water. Its width varies widely. Off the United States coast in the Gulf of Mexico, the area involved is 149,000 square miles. - G. D. H., Jour. Inst. Petrol., vol. 32, No. 266, 1946, p. 30A.

9. RELATED NONGEOPHYSICAL SUBJECTS

8757. Andreev, N. N., and Brekhovskikh, L. M. Propagation of Sound in Water, as Affected by Depth of Submersion. Compt. rend. (Doklady) Acad. Sci., URSS, Moscow, vol. 47, No. 6, 1945, pp. 400-402.

A summary is given of the previous mathematical findings of L. Brekhovskikh on sound propagation in water (see abs. 8760 in this issue). To verify these deductions, experiments were made at sea. A point source emitted a sound from a depth at least equal to the draft of the survey ship, and the sound pressures were measured at a distance of 100 meters with a hydrophone placed at a depth of 4 meters. The frequencies employed increased up to 12,000 cycles.

The results are analyzed within a frequency range compatible with a point source. A curve is plotted for the mean frequency of octaves against the ratio between the pressures measured at a source depth of 2 meters and the pressures measured at a source depth of 4 meters; another and a third curve are plotted for measurements made for source depths of 1, 2, and 3.5 meters. In all the three curves, the ratio approaches unity with the increase of frequency. These empirical curves closely correspond to previously deduced theoretical curves. - V. S.

8758. Baker, M. B. Gold and Iron Prospects in Canada. Trans. Roy. Soc. Canada, Ottawa, vol. 37, No. 4, 1943, pp. 1-8.

Most of the 60,000,000 ounces of gold that has been produced by Canada has been mined since 1900. Before 1900 gold came mainly from rich placers, and a search for pre-Cambrian drainage patterns might reveal further rich deposits. Geophysical prospecting might discover iron ores of the Lake Superior type. - M. A. P., Mineral. Mag., London, vol. 27, No. 193, 1946, Abstracts, p. 234.

8759. Bergmann, Ludwig. Ultrasonics and Their Scientific and Technical Applications. John Wiley & Sons, New York, 1944 (?), 264 pp. Price $4. (Translated from German.)

This book deals with high-frequency sound waves and their applications n science and technology. The material covers the generation of ultrasonics, etection and measurements of waves, determination of velocity and absorption n different media, and various particular uses; attention is centered on the xperimental work. The laws of sound valid for the audible range hold also or the inaudible or ultrasonic range, though additional phenomena appear in he latter case. The modern methods of generation make it possible to produce ltrasonic vibrations of a frequency as high as 5 by 10^5 kc., so that the hortest ultrasonic waves have the wave magnitudes of visible light. Many nvestigations can be made without interference from boundary walls. - V. S.

760. Brekhovskikh, L. M. Sound Propagation from a Source Placed in Water at Small Depth. Compt. rend. (Doklady) Acad. Sci., URSS, Moscow, vol. 47, No. 6, 1945, pp. 396-399.

When a source of sound is placed in water at shallow depth, its power s dampened by proximity of the surface. The problem under consideration is athematical determination of the depth at which the effect of the surface isappears.

A solution is sought for three particular cases: (1) Deep sea, where eflections from the bottom can be disregarded. The equations deduced show hat half of the power would be emitted if the source of sound were submerged o 1/6 of its mean wave length. (2) Finite depth with a bottom giving bsolute reflections, a case opposite to the first considered. An optimal ower would be obtained if the source were submerged to a depth ranging from /6 to 1/4 of its mean wave length. (3) Point source placed on a screen, .g., at the bottom of a hemisphere. Such a source does not differ materially rom a similar source located at the shortest distance from a free water suracce as measured along the curvature of the hemisphere. In all three cases he depth of the source determines not only the effective power of the sound ut also the spatial distribution of sound pressure. - V. S.

761. Cox, B. B. Transformation of Organic Material into Petroleum Under Geological Conditions. Bull. Amer. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 5, 1946, pp. 645-659.

This outline lists observations that are being used to guide a geologially coordinated laboratory study on the transformation of organic material nto petroleum by chemists, biologists, physicists, and geologists. The ffect of the movement of fluids and gases through sediments on the alteraion of petroleum and its possible bearing on the origin of petroleum are mitted from this outline because of the broad nature of this subject. igration will have to be considered in future studies after basic condiions and processes of transformation of organic material into petroleum ave been proved. Limiting conditions are confined to marine organic origin f petroleum, temperature and pressure limits, and time. An evaluation of resent knowledge with some suggestions for future studies in chemistry, hysics, and biology under conditions simulating geologic history are given. Author's abs.

8762. DeLury, J. S. Correlation of Schistosity and Tectonic Theory. Am. Jour. Sci., New Haven, Conn., vol. 239, No. 1, 1941, pp. 57-73.

Common views of schists and their attitudes are derived largely from hypotheses that take little account of the possible importance of intrusion as a cause of major deformation. In contrast, the writer favors the interpretation that deformation is brought about mainly by the forceful migration and intrusion of magma. The attitudes of foliation and their relations to folded and unfolded bedding planes seem to support such a concept. The chief conclusion is that bedding-plane foliation, as exhibited in sedimentary formations that were deeply buried and invaded by granitic magmas, is best explained by differential stresses set up by the forceful, horizontal invasion of these magmas. - Author's abs., abridged by V. S.

8763. DeLury, J. S. Compression Creep of Rubber and Rock. Jour. Geol. Chicago, Ill., vol. 50, No. 2, 1942, pp. 189-199.

The slow kind of movement against outside resistance, named "compression creep," suggests the view that the rate of geological deformation is correlated better with small forces operating through long time than with mighty forces in critical periods. A laboratory demonstration of this hypothesis may be made with rubber sheets. The author applies the principle of compression creep to problems involved with overcoming of friction along the soles of overthrusts, the rate and periodicity of mountain folding, and the deformation of the earth by the weight of ice sheets. - Author's abs., abridged by V. S.

8764. Forrester, J. F. Principles of Field and Mining Geology. J. Wiley & Sons, New York, 1946, 647 pp. Price, $7.

This book analyzes geological field techniques applicable particularly to mining problems. It deals with the recognition of geological phenomena in the field, methods of surveying and of recording field observations, and the interpretation and use of data. Under prospecting methods are discussed pit, shaft, and trench sinking, bulldozing, borehole drilling, and geophysical exploration. The latter is treated essentially in the light of C. H. Heiland and J. J. Jakosky's expositions of the principles and methods of applied geophysics. Magnetic, electrical, gravimetric, and seismic methods are outlined. - V. S.

8765. Glen, J. A. New Role of the Canadian Prospector. Western Miner, Vancouver, B. C., vol. 19, No. 6, 1946, pp. 59-61.

In Canada, the prospector is becoming an integral part of the system of mineral development, and his role in it promises to grow in importance. Government departments, mining companies, and prospectors' associations promote instruction in scientific methods, preparation of geological and topographical maps, and improvement of transportation facilities. With these ds, the prospector is able to concentrate on the remote, unexplored parts the Canadian Shield promising extensive mineral discoveries. Possessing unique knowledge of wilderness, he increasingly acts as a scout for the ning companies that follow him with detailed scientific exploration. - V. S.

66.Goldstine, H., and Goldstine, A. The Electronic Numerical Integrator and Computer (ENIAC). Math. Tables & Other Aids to Comput., Washington, D. C., vol. 2, No. 15, 1946, pp. 97-110.

A description is given of the construction, operation, and applications the electronic computing machine ENIAC recently made public by the United ates Army Ordnance. To insure accuracy, ENIAC normally handles 10-digit mbers but can be made to operate up to 20 digits. The apparatus is a rge U-shaped assemblage of 40 panels, which together contain about 18,000 cuum tubes and 1,500 relays. These panels are grouped to form 30 units, ch performing one or more of the functions requisite for the calculations signed.

The units comprise 20 accumulators for addition and subtraction, a ltiplier, a combination divider and square rooter, three function tables r storing numbers, constant transmitter of stored or punched-card numbers, M card reader, IBM tabulator, master programmer, initiator, printer, and cling unit. Instructions are given to each unit separately or through the ster programmer by means of various systems of control switches. The eration of ENIAC is illustrated by an example of computation. - V. S.

67.Koch, W. An Adjustable Scale For Measuring Instruments. Jour. Sci. Instrum., London, vol. 22, May, 1945, pp. 94-95.

A method is described for constructing and using a scale that compensates r calibration errors. The principles involve the use of three fixed points; e appropriate scale reading is determined by the intersection of a movable ne with an arc passing through each point of the scale. The line is justed by reference to the fixed points. - Phys. Abs., vol. 48, No. 575, 45, p. 298.

68.Oil Weekly. 1946 World Oil Atlas. Houston, Tex., May 20, 1946, 320 pp. Price $1.

In this atlas are included maps of all the countries, colonies, and rritories of the world having commercial oil production or conducting oil ploration. An introduction presents world maps of airlines, commercial il movement, and petroleum possibilities, as well as statistics of petroleum eserves and crude production. The maps of the different countries and parts countries are accompanied with explanatory and historical information and tatistical tabulations. For the United States, productive and nonproducing ildcats drilled to date and other additional data are included. The tatistical information of the atlas is brought up to 1946. - V. S.

8769. Pettersson, Hans. Iron and Manganese on the Ocean Floor. Meddelanden fran Oceanografiska Institutet i Goteborg, No. 7, 1945, 37 pp.

Problems related to the varying content of manganese and iron in deep-sea deposits are discussed, as a contribution to submarine geology. The hypothesis of a biological extraction from the seawater of the two elements, recently revived by Correns, is found inadequate, and alternative explanations are considered. Lines for future research are indicated. - Author's abs.

8770. Pirson, S. J. Reflections on the Origin of Oil. Mineral Industries, State College, Pa., vol. 15, No. 5, 1946, pp. 1, 3-4.

The telluric-electrolytic theory of petroleum genesis, migration, and accumulation is discussed with a view to furthering the finding of oil deposits. This theory grew out of an accidental association between earth currents and Koble's electrolytic hydrocarbon synthesis. It distinguishes three phases in the process of oil formation - syngenetic, diagenetic, and epigenetic; these are described. Gigantic electrolytic media, or cells, are postulated, in which electrical currents transport organic ions from their place of burial toward regions of higher potential (such as sediments or traps) serving as anodes.

Such a theory furnishes to oil prospectors both an indication of the direction in which to explore, once the potential source beds are recognized, and a method of determining whether a bed has already yielded negligible, partial, or complete amounts of its oil potential. If the yield is only partial, commercial oil and gas fields can be expected in the subsurface. - V. S.

8771. Raaf, J. F. M., de. Notes on the Geology of the Southern Rumanian Oil District, With Special Reference to the Occurrence of a Sedimentary Laccolith. Quart. Jour., Geol. Soc. London, vol. 101, Nos. 401/2, 1945, pp. 111-134.

The Tertiary stratigraphy and tectonics of the Carpathian foothills north of Bucharest are described briefly. Apart from slow movements during sedimentation, there are two major folding phases, in pre-Burdigalian and post-Levantine times, respectively. Normal salt plugs similar to the "salt domes" of other countries occur, usually in the core of anticlines. Elsewhere along faults, intrusions of salt breccia have been observed. In the vicinity of Campina, an intrusion of clayey salt-breccia along bedding planes in the Sarmatoid sequence is described in detail. This body of salt-breccia does not represent an ancient mud-flow contemporaneous with the Sarmatoid beds, but an intrusion at a later date of foreign sedimentary material. Rock salt, although present near the surface in its immediate vicinity, has not been observed in the above-mentioned intrusion, for which the author uses the term "sedimentary laccolith". - Author's abs.

772.Science Illustrated. Prospecting by Air. New York, vol. 1, No. 4, 1946, pp. 30-32.

Mineral deposits manifest themselves on the surface by landmarks iden-
ifiable on aerial photographs. Salt domes indicative of oil possibilities
ave an unmistakable contour. Iron and copper ores lying close to the sur-
ace kill vegetation and produce open spaces. Chromium and nickel also may
enude the soil. Gold, copper, and silver usually are found where rocks
reak the surface. A rotted upper surface of underground rock betrays under-
ying greenstone, granite, or quartz. To distinguish rock from soil on
erial photographs, the difference between their indices of light reflection
ay be used. Geologists look forward to electronic equipment for measuring
he wave length of reflected light as a means of identifying ground formations.
olor films also show significant color variations in soil, rock, and vegeta-
ion. Furthermore, the camera catches the swell of an underground formation
eneath a plain, and stereoscopic pictures help to discern its contours. -
. S.

773.Umbgrove, J. H. F. The Pulse of the Earth. M. Nighoff, The Hague, 1942, 179 pp.

This book deals with the periodic events of the earth in their chrono-
ogical sequence. Five recurring stages can be distinguished: (1) World-
ide regression of the epicontinental seas, intensive erosion, and intrusion
f acid batholiths; (2) decreasing crustal compression, emergence of mountain
hains, and formation of geosynclines and basins; (3) growth of mountains,
ormation of rift valleys, volcanism, and outpouring of basic lavas; (4)
rosion of mountains and rise of ocean level; and, finally, (5) vast expan-
ion of epicontinental seas and mild climate. Such sequence has taken place
wice since Cambrian time, with a periodicity of 250 million years; it is
ermed the cosmic cycle. Such conclusions are based by the author upon the
esearch of Vening Meinesz, Barrell, Bucher, Daly, Griggs, Holmes, Wegener,
oly, DuToit, Still, Suess, Cloos, and others. Tables and plates illustrate
he text. (A review by W. Ver Wiebe appeared in Bull. Am. Assoc. Petrol.
eol., vol. 30, No. 2, 1946, pp. 279-280). - V. S.

774.Van Tuyl, F. M., et al. Review of Petroleum Geology in 1945. Quart. Colorado School Min., Golden, Colo., vol. 41, No. 3, 1946, 203 pp.

As in the preceeding issues of the annual Review of Petroleum Geology,
he subject is broadly treated to include developments in basic geologic
ciences and such borderline fields as geophysics, geochemistry, and the
nterpretation of aerial photographs, in addition to the more restricted
hases of geology applied in the oil industry. The text as well as the
ibliography of the present issue is more complete than in earlier ones.
he inclusion of a new section on world exploration and development is
elieved to be justified because of the growing interest in foreign reserves.
Author's abs., abridged by V. S.

8775.Waldschmidt, W. A. Gramp's Field, Archuleta County, Colorado. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 4, 1946, pp. 561-580.

Gramp's oil field, Archuleta County, Colorado, was discovered in 1935, and until now virtually no information pertaining to the field has been released for publication. This article sets forth details regarding the geology of the field. The oil is being produced from the Dakota sandstone (Upper Cretaceous), in which it has accumulated against an east-west fault that crosses a north-south anticlinal axis. The average thickness of the producing part of the Dakota sandstone is 152 feet. - Author's abs., abridged by V. S.

8776.Waugh, B. W. Air Photography in Canada. Western Miner, Vancouver, B. C., vol. 19, No. 6, 1946, p. 48.

A brief outline is given of the development of air photography in Canada (essential for surveys with the airborne magnetometer). Contour maps from ground photographs appeared in 1888. Then cameras were placed on airplanes and served for mapping Canadian territory during 1920-39. Up to 250,000 square miles were photographed vertically and 600,000 square miles by oblique photographs, the latter by the so-called Canadian method. The use of photogrammetry in the war brought about improvements in planes, camera lenses, emulsions, processing methods, and photo paper. In the United States, the Canadian oblique method was developed into the trimetrogon method, which the Army Air Force used for photographing about 15 million square miles. It is proposed to apply this method in Canada for mapping some additional 1,500,000 square miles in order to complete the local air charts. - V. S.

8777.Weber, V. V. Oil-Bearing Facies of Productive Formations (in Russian). Bull. (Izvestiia) Acad. Sci., URSS, Moscow, Sér. Géol., No. 2, 1945, pp. 6-25.

The author has studied the oil-bearing facies of productive formations in the southeastern Caucasus near the Baku region. The investigation revealed continental, deltaic, and lagoonal facies, the distribution of which is described. When analyzed in relation to oil accumulation, this distribution indicates that the lagoonal facies are the only ones invariably associated with oil. They are found in the oil-bearing marginal zone of the post-Pontine basin of Baku on the Apsheron peninsula, and they extend in the form of bays to Kabristan and the Kura depression, also known to contain oil. Moreover, the various environmental conditions prevalent in that geological epoch, such as the quiescent character of the basin, high salinity, and alternation of sand and clay, should have favored oil formation. These observations led the author to conclude that lagoonal facies contain primary oil and have diagnostic value in oil exploration. - V. S.

778.Work, R. A. Mechanized Transport for Snow Surveying. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, p. 396-399.

This paper gives the reasons for the increased interest of surveyors n mechanized travel on snow, lists 12 characteristics to be noted in the erformance of such machines, and describes a series of field tests of a articular make of snow vehicle. This vehicle, which is described, met the equirements of performance. - Author's abs.

779.Wrather, W. E. Mineral Resources and Resourcefulness. Min. Mag., Denver, Colo., vol. 36, No. 5, 1946, pp. 185-186, 200; also Min. & Metal, New York, vol. 27, No. 475, 1946, pp. 427-428.

Mineral discovery and development in the United States is reviewed riefly from the standpoint of the depletion of natural resources by the ar. During the last 40 years, few discoveries of major importance have een made in virgin territory. The principal deposits now mined were known t the beginning of the century, and they approach exhaustion. In order to dvance exploration, a new philosophy of "discovery thinking" should be dopted.

As an example of the success of such thinking, the phenomenal record f petroleum discoveries in the United States during the 1930's, achieved y the cooperation of geologists and geophysicists, is cited; another xample is the discovery of potash in New Mexico in 1925. To parallel these uccesses in the mining industry, it is necessary to gain an understanding f the laws of ore deposition, prepare topographic and geological maps, onduct basic investigation and trial experimentation, and inaugurate a road program of exploration. The Federal Government should assist the ndustry in these efforts essential to the welfare of the entire nation. - . S.

10. PATENTS

(The figure in parentheses refers to the class in which the entry stands; ee list in the table of contents.)

3780.(1) Toestel voor meten van de versnelling der zwaartekracht of verandering daarvan bet behulp van een veerend opgehangen massa (Apparatus for Measuring the Acceleration of the Force of Gravity or the Variation Thereof by Means of a Resiliently Suspended Mass). Bolidens Gruvaktiebolag, Stockholm. Dutch Patent 49,422, issued October 15, 1940.

The mass with its suspending device is completely housed within a vessel f high caloric capacity made of a material of high conductivity. This vessel, in turn, is completely housed in a Dewar vessel. An electric heating device is mounted on the first vessel, preferably consisting of an electric resistance wound about that vessel and regulated by an automatic temperature regulator within it. The purpose of these arrangements is to keep the temperature of the instrument constant, inasmuch as changes in temperature affect the results of measurement. - Claims allowed, 1,

8781.(2) Gyro Flux Valve Compass System. R. S. Curry, Jr., Baldwin, N. Y., assignor to Sperry Gyroscope Co., Inc., Brooklyn, N. Y., a corporation of New York. U. S. Patent 2,393,974, issued February 5, 1946.

A gyro flux valve compass system comprising a flux valve, means for rotatably supporting said flux valve, a directional gyro, precessing means for changing the azimuthal position of the gyro, electrical means controlled by the gyro and operable thereby in its azimuthal movement to position said rotatable flux valve in azimuthal agreement therewith, and means responsive to the output of said flux valve for controlling said precessing means for the gyro, whereby said gyro, through the electrical means controlled thereby, may restore the flux valve to its original position if said flux valve should depart therefrom. - Claims allowed, 12.

8782.(2) Apparatus for Responding to Magnetic Fields. V. V. Vacquier, Oakmont, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,406,870, issued September 3, 1946.

An apparatus responsive to magnetic fields, comprising a pair of cores of material of high permeability and so characterized that the hysteresis loop thereof exhibits a sharp knee where saturation is reached, means for generating periodic sawtooth wave forms, and for cyclically energizing said cores therewith to saturation, whereby each core abruptly reaches saturation at a phase of the energizing cycle, which is shifted by changes in the ambient field at said core, windings adjacent said cores connected in opposition to deliver the difference between the voltages induced by said cores, whereby said phase shifts cause production of sharp voltage pulses that vary in magnitude with a change in field at either one of the cores, and transducing means selective to said pulses, in energy-receiving relation to said windings. - Claims allowed, 9.

8783.(2) Apparatus for Responding to Magnetic Fields. V. V. Vacquier, Garden City, N. Y., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,407,202, issued September 3, 1946.

An apparatus responsive to space gradient of magnetic field comprising a pair of slender cores of minimal cross-sectional area and of material of high permeability and so characterized that the hysteresis loop thereof exhibits a sharp knee where saturation is reached, said cores arranged parallel to each other and with a space between them such that the gradient may

tablish a difference in field at their respective locations, means for
clically energizing said cores to saturation in the same sense whereby each
re abruptly reaches saturation at a phase of the energizing cycle which is
ifted by changes in the ambient field of said core, windings adjacent said
res connected in opposition to deliver the differences between voltages
duced by said cores, whereby said phase shifts cause production of sharp
ltage pulses which vary in magnitude with a change in field at either one
the cores, and transducing means selective to said pulses in energy-receiv-
g relation to said windings. - Claims allowed, 6.

84.(3) Method and Apparatus for Recording Seismic Waves. J. P. Minton and R. A. Broding, Dallas, Tex., assignors to Socony Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York. U. S. Patent 2,392,758, issued January 8, 1946.

Apparatus for detecting and recording seismic waves that comprises means
generate an electrical carrier current wave of a frequency higher than that
the seismic waves to be detected, means to modulate said carrier current
ve in accordance with said seismic waves, means to filter said modulated
rrier current wave to eliminate unwanted frequencies, a recorder for record-
g the filtered signals, and means to vary the amplitude of the carrier cur-
nt wave to vary the sensitivity of the apparatus. - Claims allowed, 12.

785.(3) Explosive Cartridge Assembly. Richard Martin, Tulsa, Okla., assignor to Illinois Powder Manufacturing Co., St. Louis, Mo., a corporation of Illinois. U. S. Patent 2,396,518, issued March 12, 1946.

A multi-explosive cartridge column comprising a plurality of standard
per-wrapped cartridges disposed in endwise abutting relation and a plurality
f sleeves disposed in end-to-end relation around said cartridges, said
artridge extending into said sleeves from opposite ends thereof, and metal
trips extending through the respective sleeves along the inner faces of said
leeves and bent over the ends thereof, said strips having a plurality of
ongitudinally spaced prongs struck therefrom that bite into the paper wrap-
ing of said cartridges when the latter are inserted in said sleeves and are
nclined in a direction that will bring about an increased gripping action of
aid prongs under forces tending to separate said cartridges and sleeves. -
laims allowed, 2.

786.(4) Method of Surface Prospecting. R. G. Piety, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,390,270, issued December 4, 1945.

The method of electrical prospecting comprising establishing a sequence
f stations at spaced points along a traverse on the surface of the earth,
upplying a constant low-frequency, alternating, electric current to a fixed
arthed current electrode at a distance from said stations at least 20 times
he distance between adjacent stations and to each station in succession to

cause flow of electric current there-between, the distance between each of said stations and the earthed current electrode being substantially constant for each successive station; and successively measuring the potential at each of a series of stations adjacent each station to which current is supplied, relative to a fixed earthed potential electrode spaced from said stations at a distance at least 20 times the distance between adjacent stations, said earthed potential electrode being spaced at a great distance from said earthed current electrode. - Claims allowed, 2.

8787. (4) Well Logging. G. S. Bays, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,392,357, issued January 8, 1946.

A method of logging the strata traversed by a drill hole filled with fluid, comprising passing an electrical current between two spaced points in said hole, producing a first voltage proportional to the impedance to flow of said electrical current, producing a second voltage proportional to the impedance of said fluid only, applying the difference in said voltages to a variable impedance, varying the value of said impedance inversely in relationship to the diameter of said bore hole and producing an indication proportional to the current through said impedance, whereby a specific resistivity log of said strata can be made. - Claims allowed, 2.

8788. (4). Method for Determining the Oil Content of Subterranean Formations. H. G. Doll, Houston, Tex., assignor to Schlumberger Well Surveying Corp., Houston, Tex., a corporation of Delaware. U. S. Patent 2,395,617, issued February 26, 1946.

A method of determining the oil content of an oil-bearing formation traversed by a bore hole, comprising taking a core of said formation, determining the lithological character of the core and the salinity of the formation water, preparing one or more samples of material having the same lithological character as said formation and containing accurately predetermined proportions of oil and water, said water having the same salinity as said formation water, and the number of samples being sufficient to afford an accurate knowledge of the relation between resistivity and oil content, water-content ratio over a continuous range of oil content, water-content ratio values, determining said relation, measuring in the bore hole the electrical resistivity of the formation, and comparing said measured resistivity with said relation to determine the oil content corresponding to said measured resistivity. - Claims allowed, 4.

8789. (4) Method and Apparatus for Electrically Coring in Cased Boreholes. G. H. Ennis, Long Beach, Calif., assignor of one-half to Robert V. Funk, Long Beach, Calif. U. S. Patent 2,397,254, issued March 26, 1946.

An apparatus for locating strata in a well having a casing therein, being a combination of: a casing circuit including a ground connection of opposite electro-potential relative to said casing, and an external conductor connected to said ground connection and said casing; a well circuit, including an electrode movable in said well, a ground connection of opposite electro-potential relative to said electrode, and an external conductor connected to said ground connection and to said electrode; means for electrically connecting said circuits; and electrical measuring means for one of said circuits. - Claims allowed, 14.

8790.(4) Method and Apparatus for Electrically Logging Wells. G. E. Archie, Houston, Tex., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,400,678, issued May 21, 1946.

In a method for determining the salinity of the liquid present in the formations traversed by a borehole not containing an electrically conductive liquid, the steps of positioning at substantially the same level in the borehole a plurality of confined electrolyte bodies each having different calibrated electrolytic properties, causing a plurality of spontaneous potentials to be created by establishing a liquid junction between each of said electrolyte bodies and the formation liquid, simultaneously and separately recording said spontaneous potentials, and determining the salinity of said formation liquid by comparing the values of the spontaneous potentials created at the junctions of said formation liquid with each of said calibrated electrolyte bodies. - Claims allowed, 5.

8791.(4) Werkwijze voor onderzoeken van ondergrondsche lagen (Method of Studying Subterranean Strata). Standard Oil Development Co., New Jersey. Dutch Patent 48,412, issued May 15, 1940.

A difference of potential is imparted to two electrodes placed in the earth, and the characteristics of the current between them are recorded at a number of points on the earth's surface. Two pairs of measuring electrodes are placed on the earth's surface along the path of the current between the electrodes connected with an indicating instrument, so that a variable component of the current is received by each pair and the difference is observed on the instrument. - Claims allowed, 1.

8792.(4) Werkwijze en inrichting foor het onderzoekn van den inhoud van een boorgat (Method and Device for Studying the Contents of a Borehole). N. V. De Bataafsche Petroleum Maatschappij, The Hague, Dutch Patent 49,197, issued September 16, 1940.

The purpose of this invention is to locate, by means of electric devices, water incursions into oil wells. An apparatus equipped with two electrodes and an electronic tube is lowered into the borehole, and the variations of the plate current of the tube are measured. These variations are caused only by changes in the composition of the material of the borehole between the two electrodes, one of which is connected with the cathode and the other with the grid. - Claims allowed, 3.

8793.(5) Soil Analysis by Radiant Energy. Edward Lipson, Houston, Tex. U. S. Patent 2,394,703, issued February 12, 1946.

In the logging of wells, the method comprising the steps of obtaining formation samples at different levels within a well, applying radiant energy such as gamma rays to the samples, and measuring the relative amount of radiant energy transmitted through different ones of said samples as an indication of the hydrocarbon content of such samples due to the original proximity of the samples to formations containing hydrocarbon fluids. - Claims allowed, 5.

8794.(5) Radiation Detector. D. G. C. Hare, Houston, Tex., assignor, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,071, issued March 19, 1946.

A device of the Geiger counter type for detecting gamma radiation, comprising a metallic plate member forming a cathode, said plate being provided with at least one hole, and an anode member comprising a wire extending through said hole and insulated from said cathode plate. - Claims allowed, 9.

8795.(5) Radiation Detector. D. G. C. Hare, New York, N. Y., assignor to Texaco Development Corp., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,072, issued March 19, 1946.

A radiation detecting device comprising a plurality of plates disposed in separated, substantially parallel relation about a center axis, the major portion of each plate being inclined with respect to said axis, and the inclined portions of adjacent plates crossing a plane disposed at right angles to said center axis, said plates being connected together to form a cathode, each of said plates being provided with at least one hole, with the holes in the plates disposed in alignment, and an anode member comprising a wire extending through said aligned holes. - Claims allowed, 11.

8796.(5) Radiation Detector. D. G. C. Hare and Gerhard Herzog, Houston, Tex., assignors, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,073, issued March 19, 1946.

In a radiation detecting device of the counter type, a supporting envelope, a pair of metallic plates connected together electrically to form a cathode, said plates being disposed in separated parallel relation to provide a space therebetween, and an anode disposed in said space, said anode including means for causing concentration of the field between said anode and said cathode. - Claims allowed, 13.

8797.(5) Radiation Detector. D. G. C. Hare and Gerhard Herzog, Houston, Tex., assignors, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,074, issued March 19, 1946.

A detector of gamma radiation comprising a substantially rectangular rame, a second substantially rectangular frame within and at right angles o said first frame, said second frame being electrically insulated from the irst mentioned frame, a plurality of cathode plates supported in parallel paced relation by two opposite sides of the first frame, and a plurality f anode wires supported by two opposite sides of said second frame, said ires passing between and parallel to said cathode plates. - Claims allowed, .

3798. (5) Radiation Detector. D. G. C. Hare and Gerhard Herzog, Houston, Tex., assignors, by mesne assignments, to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,397,075 issued March 19, 1946.

In a detector of penetrative radiation in which a cathode and an anode re disposed in a gas-filled housing and connected to a source of high lectrical potential, means for minimizing leakage between said cathode and node comprising electrical insulators between said cathode and said anode, metallic member adapted to support said insulators, thereby supporting aid cathode and said anode, and means for connecting said supporting member o a source of potential intermediate that to which said cathode and said node are concerned. - Claims allowed, 7.

3799. (6) Remote-Reading Temperature Instrument. Richard Scott, Toronto, Ontario, Canada, assignor to General Electric Co., a corporation of New York. U. S. Patent 2,393,197, issued January 15, 1946.

A receiver for a direct current telemetering system comprising an annuar magnetic core with an air gap therein, a magnetic rotor substantially oncentrically mounted within said core and permanently magnetized transersely to its axis of rotation and the axis of said core, a pair of windings inking said core, said windings being spaced with their centers less than 80 degrees along the solid portion of said core and substantially equally istant from the air gap therein, said windings each comprising a pair of oils connected in bucking relation, and a direct current source of supply onnected to supply one coil of each winding in proportion to the voltage of aid source, and to supply the remaining coils of each winding in proportion o a variable to be indicated by such receiver, such that at one end of the ange of operation of the receiver the resultant flux of one winding is zero nd the resultant flux of the other winding is in a given direction in the ore, and at the other end of the range of operation the resultant flux of he last-mentioned winding is zero and the resultant flux of the first-mentioned winding is in the opposite direction in the core. - Claims allowed, 1.

3800. (6) Thermal Prospecting. L. W. Blau, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware. U. S. Patent 2,403,704, issued July 9, 1946.

A method for prospecting for oil, which comprises drilling boreholes at spaced points over an area to be surveyed, suspending a thermometer in each borehole at a selected depth, the depths being substantially the same for all boreholes and being at least sufficiently great to exclude the effect of surface conditions, pouring earth into the hole above the thermometer so as to reproduce as nearly as possible the conditions obtaining before the hole was drilled, allowing the thermometer to remain in place until successive readings thereof, at suitable time intervals, are substantially the same, thereby indicating that thermal equilibrium has been reached, and recording the reading of the thermometer after equilibrium has been attained for the purpose of correlating it with similar readings made in other holes to determine the contours of isotherms. - Claims allowed, 4.

8801.(7) Apparatus for Analyzing Hydrocarbons. H. E. Metcalf, Walnut Creek, Calif., assignor to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. Patent 2,393,650, issued January 29, 1946.

Apparatus for analyzing hydrocarbon gas, comprising a test chamber; an anode and a cathode with a gas-sensitive, low-work-function surface located in said chamber; means for measuring the electron emission from said cathode; means for measuring the pressure within said chamber; means for feeding a stream of hydrocarbon gas to be tested into said chamber; and means for creating a high degree of vacuum in said chamber. - Claims allowed, 4.

8802.(7) Apparatus for Gas Analysis. W. M. Zaikowsky, Pasadena, Calif., assignor, by mesne assignments, to Consolidated Engineering Corp., Pasadena, Calif., a corporation of California. U. S. Patent 2,393,674, issued January 29, 1946.

Apparatus for analysis of soil gas for hydrocarbons indicative of petroleum deposits, comprising purifying train means for removing hydrogen and carbon monoxide from the gas to be analyzed, combustion chamber, a valved conduit connecting said means to said combustion chamber for transfer of gas from said means to said combustion chamber, first heating means mounted within said combustion chamber for oxidizing said gas in said combustion chamber, measuring means associated with said combustion chamber adapted to indicate changes in the molal volume of said gas, and second heating means enclosing said combustion chamber for maintaining the water of combustion in vapor phase during such measurement. - Claims allowed, 4.

8803.(9) Apparatus for Determining Permeabilities of Porous Media. J. T. Hayward, Tulsa, Okla. U. S. Patent 2,390,252, issued December 4, 1945.

Apparatus for determining the permeability of a porous medium, comprising a pair of fluid conduits connected to a common source of fluid supply and arranged in a bridge structure having the Wheatstone arrangement, each of said conduits comprising one side of said bridge structure, the first of said nduits including a pair of adjacent arms designated as a first arm and a econd arm, and the second of said conduits including a pair of adjacent rms designated as a third arm and a fourth arm; a pressure-balancing con- it connecting the two sides of the bridge at points intermediate each pair f adjacent arms, pressure balance-indicating means operatively associated ith said pressure-balancing conduit, said first and second arms consisting f a single elongated tubular body having a fluid inlet at one end thereof, fluid outlet at the opposite end thereof, and an opening intermediate the nds thereof communicating with said pressure-balancing conduit; a plunger xtending into said tubular body through one end thereof, the degree of learance between said plunger and said body being such as to define a estricted fluid passageway to thus provide a first permeance in said first rm and a second permeance in said second arm, means for interposing a porous edium in said third arm, said fourth arm comprising an elongated tubular ember having a fluid inlet at one end and a fluid outlet adjacent the pposite end; a tapered plunger reciprocable in the bore of said body through aid opposite end, the clearance between said tapered plunger and said body eing such as to define a fluid passage, means for reciprocating said tapered lunger within said body to vary the permeance of the fluid passage, an index ssociated with said tapered plunger for indicating the longitudinal position f said tapered plunger relative to said tubular body, and means for causing luid to flow from said source simultaneously through said pair of conduits. Claims allowed, 3.

804.(9) Radio Navigation System and Method. H. C. Morgan, Dayton, Ohio, assignor, by mesne assignments, to Curtis Engineering Co., Inglewood, Calif. U. S. Patent 2,396,112, issued March 5, 1946.

The method of aerial navigation which enables a pilot to cause his air- raft to follow a desired course, which includes defining the course on the round with a series of relatively high-efficiency reflectors laid out in a egular pattern, propagating a beam from the aircraft, causing the beam to ystematically scan the ground below the aircraft, and indicating the rela- ive position of any reflected portions of the beam, the reflected portions f the beam giving an indication of course and altitude.

An aerial navigation system for enabling a pilot to fly an aircraft ver a predetermined course comprising means on the aircraft for propagating narrow ultra high-frequency radio beam, means for causing the beam to ystematically and repeatedly scan the ground below the aircraft, reflecting eans on the ground laid out in a regular pattern along the predetermined ourse for reflecting said beam to the aircraft when it falls thereupon, and eans on the aircraft for indicating its course and altitude by the relative ocation of the reflecting means when a reflection occurs. - Claims allowed, 4.

805.(9) Electronic Surgical Metal Body Locator. D. M. Speaker, East Orange, N. J. U. S. Patent 2,393,717, issued January 29, 1946.

An electronic surgical metal body locator comprising a tuned circuit, means for probing having therein a coil connected in said tuned circuit, an oscillator of the negative transconductance type connected to said tuned circuit, and oscillator means adapted to produce a high-frequency signal, means for mixing the frequencies of said oscillations to produce an output beat-frequency signal, a frequency indicating device, and an amplifier between said mixing means and said signalling device. - Claims allowed, 12.

8806.(9) Object Detecting Apparatus and Method. W. W. Hansen, R. H. Varian, and S. F. Varian, Garden City, N. Y., assignors to the board of trustees of The Leland Stanford Junior University, Stanford University, Calif. U. S. Patent 2,406,371, issued August 27, 1946.

Object-detecting apparatus, comprising means for producing a stream of electrons; means, including a first cavity resonator in energy-interchanging relation with said stream, for velocity-modulating said stream; means for causing said velocity-modulated stream to become bunched; means, including a second cavity resonator in energy-interchanging relation with said bunched stream, for extracting high-frequency energy therefrom; means, coupled to said second resonator, for transmitting high-frequency energy toward an object to be detected; means, coupled to said first cavity resonator, for receiving high-frequency energy reflected from said object; and means for detecting changes in the velocity variations of said electron beam to provide an indication of said object. - Claims allowed, 38.

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June 1947

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

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GEOPHYSICAL ABSTRACTS 127

OCTOBER - DECEMBER 1946

WITH AN INDEX TO ABSTRACTS 124-127

COMPILED BY

V. L. SKITSKY

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GEOPHYSICAL ABSTRACTS 127

October-December 1946[1]

Compiled by V. L. Skitsky[2]

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1. GRAVITATIONAL METHODS

8807. Ballarin, Silvio. Considerazioni intorno ad alcuni metodi per il calcolo delle reduzioni topografiche nei rilievi Eötvössiani. (Analysis of Certain Methods for Calculating the Topographic Reduction of Eötvös Profiles.) Geofis. Pura & Appl., Milan, vol. 5, Nos. 3/4, 1943, pp. 93-106.

The mathematical principles of the graphic method developed by the author for calculating the topographic reduction of Eötvös gravity data are compared with the formulas of Schweydar customarily used for such purpose. The analysis covers the conditions of application, the general expression of the coefficients employed in derivation, and the mathematical relationships determining the computation of these coefficients. - V. S.

8808. Bulanzhe, Iu. D. Certain Questions of Method in Gravity Surveying. (Abs., in Russian). Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 124.

Certain methodological problems arising in gravimetric exploration are discussed. They include the evaluation of the precision of anomalies based pon variometer measurements, the use of formulas for calculating the interval etween isoanomaly lines, the determination of the optimal distances between ase stations employed in detailed variometer and gravimeter surveys, etc. ormulas are given for determining the scale of gravity maps in conformity ith the nature and precision of the field data. (Seismological Institute, oscow.) - V. S.

8809. Donohoo, H. V. W. Blimps and Mineral Reconnaissance Surveys. Mines
Mag., Denver, Colo., vol. 35, No. 11, 1945, pp. 615-620, 642.

The blimp is proposed as a type of aircraft suitable for reconnaissance surveys of mineral deposits, and gravity and magnetic measurements are discussed briefly.

(1) The blimp has the advantages of low flying, constant elevation, minimum vibration, slow motion, long endurance, and accurate horizontal and vertical controls. Its construction, operation, and application to surveying are examined. Consideration is devoted to the different types and history of balloons and dirigibles and to their flight characteristics, viewed in the light of requirements of exploration. Particular attention is given to class .

(2) Gravity and magnetic measurements fundamentally depend on Newton's law of gravitation and Coulomb's law of magnetic attraction, respectively. These relationships may lead to the determination of the depth of deposits by measurements taken from several altitudes, as has already been attempted in mines and from elevated platforms. The blimp lends itself well to such a procedure. - V. S.

8810. Fang, J. F. Gravity Anomalies and the Deflection of the Plumb Line.
Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 3, 1946, pp.
316-319.

The mathematical formulas of Vening Meinesz and Gulatee for the relationship between gravity anomalies and the deflection of the plumb line are discussed. For actual use, Gulatee divided the globe into zones surrounding the point to be computed and each zone into sectors of an angular opening $\Delta\alpha$. However, his zone radii and $\Delta\varphi\cdot\Delta\alpha$ products are not exact for the first three zones because of the use of average values.

The author has devised a method of numerical integration by which he computed corrected values. In order to lessen the work, he offers a diagram for the determination of meridional deflection. This consists of circles and radial lines, which divide the region investigated into compartments showing the meridional deflection for every milligal of gravity anomaly. The use of the diagram and subsidiary table is explained and illustrated by application to three stations in India. - V. S.

8811. Frowe, E. W. A Diving Bell For Underwater Gravimeter Operation.
Geophysics, Tulsa, Okla., vol. 12, No. 1, 1947, pp. 1-12.

The recent development of a diving bell, designed to carry a gravimeter and observer, enables the geophysicist to make correct gravity observations on a river, lake, or ocean floor. The bell, for which patents have been applied, is designed to operate in depths of water as great as 250 feet. It has been used with good results at depths ranging from 8 to 70 feet. Data taken from adjacent land and sea areas have been contoured, and the smoothness of the resulting contours indicates that the underwater gravity readings are entirely reliable.

Structural features of the diving bell and related equipment are described and plates showing exterior and interior views of the bell are given. - Author's abs. (An abstract appeared in Oil & Gas Jour., vol. 44, No. 48, 1946, p. 101.)

8812. Guzman, J. A. Memoria del ministro de minas y petroleos, 1945. (Report of the Minister of Mines and Petroleum, 1945.) Bogota, Colombia, Imp. Nat., vol. 2, 1946, pp. 65-97.

Geological, seismic, and gravimetric surveys were made in Columbia in 1944. A table in the Report's section on oil exploration and drilling lists the regions explored, the methods used, and the oil companies financing the work. Drilling activities are described. - V. S.

8813. Huelin, G. S. La determinacion de la figura de la tierra y el teorema de Stokes. (Determination of the Form of the Earth and the Theorem of Stokes.) Rev. Geofis., Madrid, vol. 4, April-June 1945, pp. 227-241.

The author presents general considerations on the determination of the geoid, critical examination of the gravimetric method, isostatic theory, conditions of the application of the theorem of Stokes, and effects of the fields of gravity anomalies. - Bull. Analyt., CNRS, Paris, vol. 7, No. 6, pt. 1, 1946, p. 1052. Transl. by V. S.

8814. Kazinsky, V. A. On the Application of Curvatures. Compt. rend. (Doklady) Acad. Sci. USSR, Moscow, vol. 48, No. 9, 1946, pp. 622-625.

In the determination of the component deflections of the plumb line by the variometer method, equations for the angles of deflection are usually solved by recourse to geometry. The author demonstrates mathematically a simpler analytical method based on the equation of R. Etwesh. This method does not eliminate the difficulties of integration of the gravitational field but overcomes them by analytical calculation made with the use of a variometer net of triangles. As a result, a system of equations is deduced for the relative evaluation of the deflections. Their resolution by means of simple computational schemes is illustrated by an example from actual practice. - V. S.

8815. Oil, New Orleans, La. Seeking Oil Beneath Bahaman Waters. Vol. 6, No. 7, 1946, pp. 12, 34.

The Standard Oil Co. of New Jersey is conducting gravimetric exploration over some 2,000 square miles of ocean floor in the northwestern Bahamas. The depth of the water in most places does not exceed 20 feet. Observations are made in a 2-ton diving chamber operated from a 112-foot ship equipped with radar for determining the position of stations. Radar targets 25 feet high, distributed at significant points over the exploration area, can be picked up over distances of 18 miles by means of the radar-wave guide atop the mast for a recording on the radar screen of the navigator. In the shallowest localities, the gravity measurements are made from a 22-foot airboat equipped with a rudder and operating in water less than 6 inches deep. - V. S.

3816. Petroleum Times, London. Anglo-American Oil Co.'s Search for Oil in Britain. Vol. 50, No. 1,274, 1946, pp. 526-528.

Oil search by the Anglo-American Co. in Great Britain during 1945 is reviewed. Geophysical exploration has centered in southern England, where further prospecting licenses were taken. As a preliminary attack, a detailed gravity survey was made of Hampshire, with a semidetailed extension over Salisbury Plain. The results suggest some promising structures not revealed by surface geology, and detailed geological mapping of the favorable sections is proposed. Select portions of the licensed territory may be covered later by seismic reflection and refraction surveys. In Great Britain the reflection method has been less effective than the refraction method. - V. S.

3817. Rankine, A. P. Prospecting for Oil. Petrol., London, vol. 9, No. 10, 1946, pp. 234-235.

The nature of geophysical prospecting for oil is explained by a brief consideration of the geological problems involved and the principles of gravitational and seismic measurements. Gravimetric instruments can detect gravity changes as small as one part in ten million, which corresponds to a change of height of only 1 foot. Investigations are being made to perfect gravity measurements under water. Seismic measurements determine the travel time of mechanical vibrations propagated down to potential oil-bearing rocks and back to the surface. - V. S.

3818. Roman, Irwin. An Observational Method to Overcome Zero Drift Error in Field Instruments. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 466-490.

By using a four-step oscillating method of observation, four values are obtained for the increment in the measured value between consecutive stations. If the drift or "zero creep" of the instrument is regular, even when large, or not linear, this furnishes a means of improving the reliability of the readings and permits the detection of erratic readings. In areal surveys, a primary net of values may be established by this oscillating method and this net used as a base into which to adjust chains of observations. Intermediate values may sometimes be desirable, such values being adjusted into the primary net by the oscillating method. An example shows the application of the method to a gravimetric survey. - Author's abs.

8819. Saxov, S. E. Some Gravity Measurements on the Island of Bornholm. Geodaetisk Institut, Copenhagen, Rept. 19, 1945, 30 pp.

The Royal Danish Geodetic Institute made a gravity survey of the island of Bornholm in 1944. The static gravimeter of Nørgaard was used over a network formed by 8 base stations with 10- to 15-km. intervals and secondary stations with 1.5-km. intervals; the main station of Bornholm was connected with the Central Station at Copenhagen. The survey included a gravimetric investigation of geological profiles over rifts and dikes of diabase, with seven of the profiles yielding positive indications. The field procedures are outlined and the data tabulated for the basic and secondary stations, the mean errors ranging from 0.10 to 0.20 mgl. The values were reduced by the methods of Airy-Heiskanen and Vening Meinesz.

The isoanomaly map of 1944 agrees closely with the map obtained by the gravity survey of 1938-41 (Geoph. Abs. 118, No. 7512) but gives more details. Both maps show unusually numerous anomaly curves in the western part of Bornholm, indicating a lack of static equilibrium. - V. S.

8820. Scheffer, Vittorio. Sull'impiego dei gravimetri in terreni montagnosi. (On the Use of the Gravimeter in Mountainous Terrain.) Geofis. Pura & Appl., Milan, vol. 3, No. 4, 1941, pp. 194-199.

Detailed gravimetric exploration, and particularly the transportation of equipment, is discussed in connection with surveys over mountainous terrain. Consideration is given to the use of automotive vehicles of special design and other means. As an example of a solution adapted to local conditions, the transportation of a Boucher gravimeter on the back of mules is described, as employed by the Geophysical Section of the Società Petrolifera Italiana in the Tusco-Emilian Appenines. The construction of the instrument, the accessory equipment, and the method of observations are outlined. - V. S.

8821. Volet, C. Sur la mesure absolue de la gravité. (On the Absolute Measurement of Gravity.) Compt. rend. Acad. Sci., Paris, vol. 222, Feb. 11, 1945, pp. 373-375.

A description is given of a method of gravity measurements utilizing the free fall of a body and employing for the body the index scale itself. The precision of determinations should at least equal that of the best measurements by pendulum. - Bull. Analyt., CNRS, Paris, vol. 7, No. 5, pt. 1, 1946, p. 845. Transl. by V. S.

8822. Zwerger, Rudolf, von. Zur geologischen Deutung regionaler Anomalien der Schwere und des Erdmagnetismus. (On the Geological Significance of

Regional Anomalies of Gravity and Geomagnetism.) Ztsch. dtsch. geol. Ges., Berlin, vol. 95, March 1943, pp. 67-69.

This paper presents a schematic summary of the conclusions that can be rawn from the recent results concerning the deep geology of Germany. Correcions and amplifications to be made with respect to notions already formed are ggested. - Bull. Analyt., CNRS, Paris, vol. 7, No. 1, pt. 1, 1946, p. 26. ransl. by V. S.

2. MAGNETIC METHODS

823. Canadian Mining Journal. The New Airborne Magnetometer. Gardenvale, Que., vol. 67, No. 10, 1946, pp. 953-956; abridged in Northern Miner, Toronto, vol. 32, No. 26, 1946, p. 9.

A lecture on the airborne magnetometer was given by J. R. Balsley, Jr., nd L. H. Rumbaugh at Ottawa under the auspices of Government agenices of the nited States and Canada. The account outlines the invention, the phases of he related research, the operation of the apparatus, the duties of the crew, he flight techniques, the test surveys conducted, and the limitations of irborne magnetometers essentially in accordance with Balsley's U.S.G.S. report see Geoph Abs. 126, No. 8659). The lecture was accompanied by a demonstration n the air, and experimental flights were made in northern Quebec and Ontario. V. S.

824. Department of Scientific & Industrial Research, N. Z. 38th Annual Report, 1943-44, Geological Survey. Wellington, Gov. Print., 1944, pp. 1-2.

N. Modriniak has made magnetic and seismological observations in the hakatane district to investigate the possibility of obtaining volcanic heat ear the sea and to extend the magnetometer work done at Rotorua. E. O. acpherson prepared reconnaissance geological maps of the Whakatane district nd Whale Island. Modriniak also continued the investigation of possible am sites on the Waikato River upstream from Arapuni Lake. Only magnetometer ork was practicable. At Hunty, an attempt is being made to ascertain the hape and structure of the coal basin concealed by the sands and silts of the aikato north of the present mines. The geophysical drill has been found most seful in boring for serpentine water in North Auckland and for coal at Hunty. - Report on Geophysical Exploration. Abridged by V. S.

onohoo, H. V. W. Blimps and Mineral Reconnaissance Surveys. Mines Mag., Denver, Colo., vol. 35, No. 11, 1945, pp. 615-620. (See abs. 8809 in this issue.)

8825. Elsasser, W. M. Induction Effects in Terrestrial Magnetism: Secular Variation. Phys. Rev., Lancaster, Pa., vol. 70, Nos. 3-4, 1946, pp. 202-212.

The method previously developed by the author for the integration of the electromagnetic field equations in the presence of fluid motions in a spherical conductor now serves for an interpretation of secular geomagnetic variations. It enables the author to study the skin effect, which shows that the observed variations of the dipole terms originate in a layer adjacent to the core's boundary several hundred kilometers deep. The zonal fluid, when considered in terms of a coupling matrix, is found to produce rotation of the tesseral magnetic dipole terms as well as oscillatory changes in the amplitude of these terms.

As there is only one type of matrix element that represents an interaction of the main magnetic dipole with itself, and as the corresponding fluid motion is a meridional flow of quadrupole symmetry, amplification or deamplification with this term depends on the sign of the velocity. Accordingly, the theory advanced can account for all the observed components of the secular variation. - V. S.

8826. Fleming, J. A. Geomagnetic Secular Variations and Surveys. Proc. Phys. Soc., London, vol. 58, pt. 3, No. 327, 1946, pp. 213-246.

The secular variations of the earth's field call for frequent determinations of the geomagnetic elements at many selected stations on land and at sea. So far, general world magnetic surveys have of necessity been restricted to the surface of the earth. The previous surveys have led to great improvement in our knowledge of the distribution of the field, especially during the past few decades. During the war, much attention has been devoted to the study and analysis of data well-distributed over the earth's entire surface at more than 10,000 stations. These investigations have resulted, for the first time, in the preparation of accurate isoporic charts, that is, charts of equal annual rate of change for magnetic declination, inclination, and the horizontal, vertical, eastward, northward, and total components of the field for the four epochs of 1912.5, 1922.5, 1932.5, and 1942.5. The motions of the maximum and minimum isoporic foci during these four epochs indicate the complexity of the secular changes and interpretations. - Author's abs. abridged by V. S.

8827. Frenkel, Ia. I. On the Origin of Terrestrial Magnetism. Compt. Rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 49, No. 2, 1945, pp. 98-101.

Terrestrial magnetism is explained by the convective motion of the electrically conductive mass in the center of the earth. The core consists of molten metal possessing a high temperature gradient, which generates convection currents in the liquid metal. Owing to the high electric conductivity of this liquid, its motion in any accidental, initially weak, magnetic field may be accompanied by a gradual increase of that field and of the electrical currents producing it, generated by the mechanism of self-excitation. However, forces electromagnetic friction tend to slow down the motion of the liquid, so that the stable state the entire power is converted into Joule's heat. The magtude of the magnetic field and the related factors are deduced mathematically. V. S.

3828.Giulietti, Giulio, and Bossolasco, Mario. Applicabilita' di nuove bussole alla determinazione degli elementi angolari del campo geomagnetico. (Application of the New Compass to the Determination of the Angular Elements of the Geomagnetic Field.) Geofis. Pura & Appl., Milan, vol. 3, No. 4, 1941, pp. 200-203.

The new induction compass of Giulietti can be used in geomagnetic investiations and navigation. In application to surveys, it serves for measuring oth geomagnetic declination and inclination. The construction of the instruent, the principles of its use, and the procedures of observation are indiated briefly. The precision is considered high and the field technique imple and convenient. - V. S.

3829. Harang, Leiv. The Mean Field of Disturbance of Polar Geomagnetic Storms. Terr. Magn. & Atm. Electr., Baltimore, Md., vol. 51, No. 3, 1946, pp. 353-380.

The diurnal variation of the mean disturbance vectors is determined at a umber of observatories lying roughly along the geomagnetic meridian 120° from pitzbergen to Potsdam. The values of the vectors have been obtained for four egrees of geomagnetic activities. The variation of the mean disturbance field cross the geomagnetic meridian 120° in the course of the day is drawn up on aps for each of the three components in D, H, and Z.

It is shown that the graphical representation of the variations in the ean D-field can be regarded as a fairly good approximation to the mean disurbance-field around the polar cap. The oscillations in the position of the -field and of the auroral zone are studied for various degrees of geomagnetic ctivities and compared with the mean positions of the aurora. Other questions f the D-field and aurora are discussed. - Author's abs. abridged by V. S.

3830. Hartmann, P. C. P. Aardmagnetische anomalieën in Nederland. (Geomagnetic Anomalies in the Netherlands.) N. V. Uitgeversmaatschappij, J. H. Kok, Kampen, Netherlands, 1945, 62 pp.

The above is a dissertation of the University at Utrecht. Chapter 1, The agnetic measurements; Chapter 2, Magnetic anomalies and geotectonic geology; hapter 3, The local anomalies. Summary in English. - J. F. S., Dominion bservatory, Ottawa, Bibliography of Seismology, No. 19, 1946, p. 321.

3831. Hurwitz, Louis, and Howe, H. H. Magnetic Observatory Results at San Juan, Puerto Rico, for 1929-30. U. S. Coast and Geodetic Survey, Washington, D. C., MO-24, 1945, 124 pp.

This publication contains extensive tables of observatory results, reproductions of magnetograms showing the more important magnetic storms, and an explanatory text. The tabulated results include hourly mean values of the magnetic elements D, H, and Z, summaries of their monthly and annual means, lists of principal magnetic disturbances, amounts of noncyclic change, observe and adopted base-line values of the D, H, and Z variometers with their abrupt changes, etc. The text comprises a description of instruments, discussions of their coefficients and behavior and of the procedures used, and explanations of the various tables. - Authors' abstract.

8832. Jensen, Homer. Validity of Data from Airborne Magnetometer. World Petroleum, New York, vol. 17, No. 9, 1946, p. 45.

The airborne magnetometer developed by the U. S. Navy and Bell Telephone Co. has been tested by the U. S. Geological Survey in application to magnetic surveying. The results point to marked advantages over ground surveys and a higher precision of data. (1) Continuous recording eliminates the need for the interpolation of data, simplifies the corrections for drift and diurnal variation, and assures the registering of actual peaks and troughs on every traverse. (2) The high altitude of flying nullifies the effects of nongeological influences from the ground, which either fail to register or can be identified easily. (3) The frequency characteristics of the instrument causing a lagging and a nonlinear response require corrections only with the small, high-gradient anomalies associated with metal deposits, but not with the large, low-gradient anomalies associated with oil structures. Other advantages are noted. The conclusion is reached that in all magnetic surveys except the most detailed ones the airborne instrument provides data more precise and more closely related to local geology than ground magnetometers. - V. S.

8833. Keller, Fred, Jr., and Hanners, A. J. A Continuously Recording Declination Station. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 485-489.

The general lack of data on the diurnal variation and secular change of the earth's magnetic field at other than the locations of the few magnetic observatories in the world makes it necessary to have inexpensive recording stations thay may be operated unattended for long periods of time.

As partial fulfillment of this need, the Coast and Geodetic Survey has proposed building a network of 20 stations in the United States. These stations are to operate for periods of 3 to 6 months without servicing, and are eventually expected to continuously record the three magnetic elements - declination, horizontal intensity, and vertical intensity. - Authors' abs.

8834. Petroleum World. Scouting the Oil Fields. Los Angeles, Calif., vol. 43, No. 7, 1946, pp. 31-37.

This article on California oil developments includes brief remarks on the ulf airborne magnetometer, its operation, results of tests, advantages in xploration, and promise of new discoveries. Mention also is made of the iving bell for gravity measurements designed by R. Bauers and J. Jakosky. - S.

oman, Irwin. An Observational Method to Overcome Zero Drift Error in Field Instruments. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 466-490. (See abs. 8818 in this issue.)

835. Scott, W. E. American Magnetic Character-Figure, C_A, Three-Hour-Range Indices, K, and Mean K-Indices, K_A, for January to March 1946, and April to June 1946. Terr. Magn. & Atm. Electr., Baltimore, Md., vol. 51, 1946, No. 2, pp. 243-246, No. 3, pp. 435-438.

Tables are given with explanatory text. - V. S.

836. Skillings' Mining Review. Magnetic Base Stations for the Iron Ranges. Duluth, Minn., vol. 35, No. 10, 1946, p. 2.

Magnetic surveys in the iron ranges of Minnesota and Michigan will be endered more precise by the magnetic base stations now being established by he United States Bureau of Mines. These stations should aid calibration of nstruments, accuracy of measurements, and correlation with previous data. he work is made by means of a special magnetometer designed by the Bureau's ivision of Geophysical Exploration. This is equipped with a Helmholtz coil or gaging sensitivity of determinations and has a precision within 5 gammas. he locations of the stations already established in the Cuyuna, Gogebic, enominee, and Marquette iron ranges are indicated. Upon completion of the ork, the Bureau will publish the magnetic data at all the base stations for he use of prospectors. The stations will be tied into the national magnetic ase at Cheltenham, Md. - V. S.

837. World Petroleum. Flying Eye for Oil Exploration. New York, vol. 17, No. 9, 1946, p. 44.

The military origins, exploratory applications, component instruments, rocedures, advantages, and possibilities of the Magnetic Airborne Detector MAD) are outlined briefly. Two principal models have been developed for oil rospecting, one by the Gulf Oil Co., and the other by the U. S. Naval Ordance and associated laboratories. The Gulf model will be used over the ahamas continental shelf; the Navy model may serve to survey Naval Reserve o. 4 in northern Alaska. - V. S.

werger, Rudolf, von. Zur geologischen Deutung regionaler Anomalien der Schwere und des Erdmagnetismus. (On the Geological Significance of Regional Anomalies of Gravity and Geomagnetism.) Ztsch. dtsch. geol. Ges., Berlin, vol. 95, March 1943, pp. 67-69. (See abs. 8822 in this issue.)

3. SEISMIC METHODS

8838. Berson, I. S. Interpretation of Tansverse Hodographs of Refracted Waves: One Level Surface of Separation. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 115-116.

Transverse hodographs have acquired considerable importance in seismic prospecting by the correlation method of refracted waves (Geoph. Abs. 121, No. 7970). Until lately, such hodographs were interpreted on the assumption that the lengths of the transverse profiles employed are very small in comparison with the distances of these profiles from the shot point. To expand usage, the author offers a method of interpretation applicable to transverse profiles of any limited length. The principle applied consists in subtracting an averaged hodograph from the observed hodograph. A technique is worked out for a practical determination of the maximum length of the transverse profile compatible with a single interpretative solution at any angle of longitudinal sloping. (To be published in Trans. Inst. Theor. Geophys., Moscow.) - Transl. by V. S.

8839. Branson, N. G. Strain-Gauge Amplifier. Gen. Elect. Rev., New York, vol. 48, No. 4, 1945, pp. 55-58.

The paper discusses how a multichannel amplifier enables a magnetic oscillograph to be used with an electric gauge to record dynamic and transient quantities. - Dominion Observatory, Ottawa, Bibliography of Seismology, No. 18, 1945, p. 296.

8840. Caloi, P. Determinazione delle coordinate ipocentrali di un terremoto ad origine vicina con i templi delle onde longitudinali e trasversali dirette. (Determination of the Coordinates of the Hypocenter of a Nearby Earthquake by Means of Arrival Times of Direct Longitudinal and Transverse Waves.) Ricerca Sci., Rome, vol. 12, Apr. 1941, pp. 431-437.

This paper discusses analytic determination of the coordinates and the depth of the hypocenter of a nearby earthquake upon the basis of known velocities of propagation and measurement of arrival times of direct longitudinal and transverse waves. - Bull. Analyt., CNRS, Paris, vol. 7, No. 4, pt. 1, 1946, p. 631. Transl. by V. S.

8841. Cody, C., and Cody, M. Seismograph Exploration in Venezuela. Petroleo Interamericano, Tulsa, Okla., vol. 4, No. 11, 1946, pp. 56-64.

In Venezuela, geophysical exploration has been on the increase during the past 5 years. Activities now center in several geological provinces: (1) Lake Maracaibo area has 4 geological parties, 4 gravity parties, and 4 seismic parties; (2) Barinas area has 1 geological party, 1 gravity party, and 4 seismic parties; and (3) Eastern Venezuela, including Guárico, has 9 geological parties, 3 gravity parties, and 19 seismic parties, with the bulk of the seismic work conducted in the plains south of the Andes.

Seismic exploration is handicapped by the scarcity of roads, accomodations, nd means of communication. A seismic party numbers from 50 to 250 men, epending on local geology and the seismic method employed. Typically, the ersonnel consists of the party chief, geophysicists, computer, observer, urveyor, tool-pusher, medical doctor, field cashier, general utility man, ooks, mess attendents, watchmen, recording crew, shooting crew, surveying rew, and drilling crew. - V. S.

842. Coulomb, Jean. Sur la vitesse de propagation de la rupture dans une faille. (On the Velocity of Propagation of a Rupture in a Fault.) Ann. Géophys., Paris, vol. 2, No. 1, 1946, p. 86.

H. Benioff has calculated the velocity of propagation of the rupture of fault upon the basis of seismic records of the Long Beach earthquake of arch 10, 1933, and arrived at the value of 4.2 km./sec. The author reviews enioff's determination and amplifies the latter's conclusions by pointing ut that only if the fault's extension was larger than 27 km., which seems ery probable, is the velocity deduced correctly. If the fault's extension as less than that, the velocity would be greater than 4.2 km./sec. - V. S.

epartment of Scientific & Industrial Research, N. Z. 38th Annual Report 1943-44: Geological Survey. Wellington, Gov. Print., 1944, pp. 1-2. (See abs. 8824 in this issue.)

843. Gamburtsev, G. A., et al. Field Work on Perfecting Seismic Methods for Exploration in the Eastern Apsheron Peninsula. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 119-120.

A survey has been made in the Baku oil region on the Apsheron peninsula, SSR, with a view to perfecting the local application of seismic prospecting. he method chosen was correlation refraction, a new modification of customary eismic refraction. Contrary to established views, the results showed that he Tertiary arenaceous clays of the peninsula can be differentiated satisactorily. Refracting layers characterized by unexpectedly high seismic elocities were discovered at considerable depths, in particular at the roof nd base of the oil-bearing formations; some of them were traced over wide istances. The applicability of refraction was considered conclusively emonstrated.

It also was found that the method of seismic reflection gives results omplementary to those of refraction, and that the two methods should be used ogether. In all, the data clarified general seismic methodology and interretation in Apsheron, peculiarites of seismic propagation in heterogeneous edia, and special questions of Apsheron seismics. (Inst. Theor. Geophys., oscow.) - V. S.

8844. Gamburtsev, G. A. Concerning the Question of the Origin of Seismic Reverberation at Sea. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 120.

The author analyzes several alternative explanations of the effects of seismic reverberation at sea which interfere with seismic exploration by the method of reflections. He finds that the most plausible hypothesis is that the interference originates in diffusion. Only a tentative solution can be reached at present because of insufficient experimental data. Additional experiments are planned. (Inst. Theor. Geophys., Moscow.) - V. S.

8845. Gogoladze, V. On Rayleigh Boundary Waves. Compt. rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 49, No. 6, 1945, pp. 400-403.

A mathematical analysis is given of the spectrum of free vibrations in two different solid elastic media in contact along a plane, with a veiw to establishing the necessary and sufficient conditions for the existence of Rayleigh boundary waves. Use is made of the equations of the potentials of elastic waves, the Rayleigh equation, and Riemann's surfaces; the mathematical deductions are presented. It is found that the investigated conditions for the existence of a point spectrum of free vibrations are as follows: $R(b_2) > 0$ for $b_2 < b_1$, or $R(b_1) > 0$ for $b_1 < b_2$. The Rayleigh boundary wave is ultimately expressed in four analytic equations, two for $y > 0$ and two for $y < 0$. - V. S.

8846. Gogoladze, V. General Formulae for the Reflection and Refraction of Non-Stationary Elastic Waves. Compt. Rend. (Doklady) Acad. Sci. URSS, Moscow, vol. 49, No. 7, 1945, pp. 479-481.

The results of the author's mathematical investigations on the propagation of elastic waves are expressed in four general formulas for the reflections and refraction of such waves. These show that elastic disturbances may be considered as an aggregate of longitudinal and transverse waves reflected and refracted under real and complex angles in the plane of separation between elastic media. Under certain conditions, the Rayleigh boundary wave is added to them with a propagation velocity smaller than that of all other waves.

The application of the formulas is discussed for a set of conditions determining the velocities of longitudinal and transverse waves. In the case of propagation of heterogeneous waves, the horizontal component of the energy flow is found to have a constant direction, whereas the vertical component may change its sign at different points in the course of time. - V. S.

8847. Gutenberg, Beno, and Richter, C. F. Earthquake Study in Southern California, 1945. Trans. Am. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 559-560.

This report on the progress of studies of earthquakes in southern California lists the work of the authors on the revised edition of the "Seismicity of the Earth" and on new publications and cites some unpublished observations.

eference also is made to the work of H. O. Wood, J. M. Nordquist, and H. T. rville. The largest earthquake shocks during 1904-45 are tabulated, and stimates are given of seismic energy released during earthquakes of different epth. - V. S.

uzman, J. A. Memoria del ministro de minas y petroleos, 1945. (Report of the Minister of Mines and Petroleum, 1945.) Bogota, Colombia, Imp. Nat., vol. 2, 1946, pp. 65-97. (See abs. 8812 in this issue.)

848. Harris, Sidon. West Texas Modern Refraction Seismic Exploration. Oil Weekly, Houston, Tex., vol. 123, No. 7, 1946, pp. 53-55.

In western Texas, the Edwards Plateau, the Delaware Basin, and minor reas on Permian beds have proved unfavorable for seismic reflection, whereas he modern multiple refraction techniques are successful. Unlike the old efraction method, these techniques do not depend on first arrivals and have greater depth of penetration with less dynamite. A schematic diagram of efraction paths and a sample of a typical record are given; the calculations ave been described by C. H. Dix, D. C. Barton, L. B. Slichter, M. Muskat, . A. Gillin, and the author.

According to performance on the Edwards Plateau, modern refraction can ccurately detect possible structure with as little as 200 feet of closure at re-Permian levels and with as little as 100 feet of closure at Permian levels. t has been credited with the discovery of the Barnhart Pool and, in part, he Midland Farms Pool. Some recommendations are given on planning refraction ork on the Edwards Plateau. - V. S.

849. Kirnos, D. P. On the Possibility that an Alluvial Soil Generates Natural Vibrations. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 98.

The experimental data presented indicate a possibility that explosions nd local earthquakes can generate in an alluvial soil its own intrinsic ibrations. (Trans. Seismol. Inst., Moscow, No. 117.) - Transl. by V. S.

850. Koning, L. P. G. Het mechanisme in den haard van diepe aardbevingen. (The Mechanisms in the Focus of Deep Earthquakes.) Handelingen van het 27-e Nederlandsch Natuur- en Geneeskundig Congres, Haarlem, vol. 27, 1941, pp. 252-254.

The author has collected all the data on the deep earthquake of June 29, 934, in the Dutch East Indies (depth of focus 700 km.). As the number of ata was insufficient to permit the application of the method of Shida and iller, the author has supposed the theoretical case that a movement took lace along a plane in the interior of the earth at a depth of 700 km. below he surface, and that the hypothetical plane of Berlage coincides with the lane of movement in the focus of the earthquake. The plane of Berlage, in hich the hypocentra may be arranged, dips with an angle of 55° beneath Asia. F. F. S., Dominion Observatory, Ottawa, Bibliography of Seismology, No. 19, 946, p. 323.

8851. Leet, L. D. Vibrations from Blasting. Explos. Eng., Wilmington, Del., vol. 24, 1946, No. 2, pp. 41-44, 55-59, No. 3, pp. 85-89.

The author discusses the nature, measurement, and effect of the vibrations transmitted through the ground from high-energy sources, including atomic bombs, and describes the scientific equipment and methods employed for recording and evaluating various types of waves. The data presented refer particularly to the use of industrial explosives, damage to buildings, and the first test of the atomic bomb. Consideration is devoted to waves on water, compressional waves, shear waves, Rayleigh waves, Love waves, coupled waves, and hydrodynamic waves, as well as to the construction and use of the Leet three-component seismograph, with illustration of the apparatus and seismograms.

The results of the past and current observations are analyzed with respect to terrain coefficient, acceleration and displacement, elastic fatigue, effects on structures, and characteristics of true vibration damage. It is found that customary industrial applications of explosives cause no damage to structures. When, however, damage is produced by sufficiently strong vibrations, the cracks appear in the unique form of crisscross or X patterns. (See also Geoph. Abs. 118, No. 7544, and G. A. 124, No. 8377). - V. S.

8852. Macelwane, J. B. The Interior of the Earth. Am. Scientist, New Haven, Conn., vol. 34, No. 2, 1946, pp. 177-197.

Our picture of the interior of the earth is admittedly a provisional one, blurred in many of its line and sketchy in its details. Yet the methods which furnished it have yielded evidence that is now generally accepted. It can be regarded, namely, that there is a layered crust underlain by a shell some 600 miles thick in which the speed of elastic waves increases rapidly with depth; that under this lies an intermediate shell some 1,100 miles in thickness, in which the rate of increase of speed with depth is less rapid but in which the absolute values of the speeds are very high; and that there is at the center of the earth a core or nucleus, with a diameter little more than half that of the earth or about twice as large as that of our moon, which strongly reflects and refracts elastic waves but about whose constitution very little is really known. - Author's abs.

8853. Masarskii, S. I. On Hodographs of Seismic Waves Reflected from the Lower Boundary of a Medium with a Variable Velocity of Propagation. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, pp. 121-122.

An analysis is made of the form of hodographs of seismic waves reflected from the lower boundary of a medium in which velocity is a function of depth. The equation deduced for the curve of such hodographs in terms of parameters shows that the concave side of the curvature faces in the finite direction of positive time. The trajectories of seismic rays are investigated. (To be published in the Trans. Seismol. Inst., Moscow.) - Transl. by V. S.

354. Merino y Coronado, J. Notes on a New Type of Electronic Earthquake Recorder. Servicio Meteorologico Nacional, San Jose, Costa Rica, mimeographed text, 1945, 4 pp.

The instrument consists of a Bosch-Omori seismograph provided with an clipsing vane, which, when the boom is moved, varies the amount of light eaching a light sensitive cell. The current in the circuit controlled by he cell is amplified and used to operate a galvanometer or milliammeter, hich serves to move a recording stylus over a smoked sheet mounted on a otating drum in the usual fashion. - Dominion Observatory, Ottawa, Biblioraphy of Seismology, No. 19, 1946, p. 324.

855. Oks, Meyer. Metodo de refraccion. (Method of Refraction.) Bol. Inform. Petrol. (YPF), Buenos Aires, vol. 22, No. 254, 1945, pp. 249-254.

In Argentina the method of seismic refraction has greater application han in the United States because it helps to clarify information about the ocal regional stratigraphy. Refraction surveys have been made down to depths f 3,500 and 5,500 meters in the valleys of the Rio Colorado and Rio Salado, uenos Aires Province. As many as six refracting horizons were distinguished, hereas seismological literature offers solutions for only four horizons. To eet local problems, the author presents a method of calculation permitting ny number of inclined layers to be reduced to one residual layer. The soluion is effected by means of successive approximations worked out by analytial and graphic procedures. Equations and drawings are presented for the teps of 1, 2, 3, and 4 inclined horizons separating successive layers. The elocity of refracted waves is determined by means of a single residual quation. - V. S.

3856. Osterhoudt, W. J. The Seismograph Discovery of an Ancient Mississippi River Channel. (Abs.) Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, p. 417.

In January 1937, a seismic party of the Gulf Research & Development Co. egan reflection and refraction seismograph surveys of south Timbalier Bay, afourche Parish, Louisiana, and adjacent waters of the Gulf of Mexico in the vicinity of 29° 05' N. latitude, 90° 15' W. longitude. Experimental shooting to determine the thickness of the slow-velocity zone revealed exceptional local variations in depth to a fairly consistent V_2 underlier. By using a measured velocity of 3,800 feet per second for the recent fill-in material and carefully plotting cross-section profiles, enough data were acquired to outline the east flank of an unknown buried river channel, probably over 600 feet deep and perhaps more than 5 miles wide.

This channel possesses the approximate dimensions and characteristics exhibited by the portion of a submarine valley mapped by the United States Coast and Geodetic Survey in the Gulf of Mexico from 28° 14' N., 89° 27' W. through 28° 38' N., 89° 57' W. Further exploration by seismograph methods, core holes, and electronic logging of shallow holes is discussed. - Abridged by V. S.

8857. Pendse, C. G. On the Theory of Seismometers. The London, Edinburgh & Dublin Philos. Mag. and Jour. Sci., London, vol. 35, No. 249, 1944, pp. 706-713.

In the theory of seismometers developed in seismological writings, full consideration does not appear to have been given to the fact that the motion recorded by a seismometer is relative to a frame determined by the instrument, whereas the system of forces in question refers to axes "fixed in the earth" relative to which the frame determined by the instrument also moves. In this paper it is proposed to obtain the exact equation of motion of a seismometer and to investigate it in an important particular case. The present work will apply mainly to horizontal seismometers.

In section 1, the exact equation is obtained in its most general form and is simplified without any loss of generality; an important particular case is taken and the corresponding equation is derived. In sections 2 and 3 this equation is solved as far as the first order of the acceleration terms. In section 4, the results obtained are discussed in relation to seismometers and seismograms. Finally, in section 5 another form for the ground motion is considered briefly. The new features shown by the investigation include the existence of resonance periods other than the free period of the instrument. - Author's abs.

8858. Perri, Emilio. Determinazione di profondita ipocentrale effettuata col sussidio di un nuovo metodo energetico. (Determination of Hypocentral Depth by Means of a New Energy Method.) Geofis. Pura & Appl., Milan, vol. 5, Nos. 1-2, 1943, pp. 47-76.

The author presents his new "energy method" for calculating the hypocentral depth of earthquakes. The underlying theory is deduced mathematically, and its practical application is illustrated for the earthquake of December 30, 1935, in Schwarzwald, Germany. The method does not depend on any time data and allows determinations of coefficients of energy absorbtion and of divergence parameters for the anisotropy of the medium. The results obtained in the example of the earthquake agree with previous determinations of hypocentral depth made by macro- and microseismic methods. - V. S.

Rankine, A. O. Prospecting for Oil. Petrol., London, vol. 9, No. 10, 1946, pp. 234-235. (See abs. 8817 in this issue.)

8859. Reed, Paul. Exploration of Orinoco Delta Fraught with Difficulties of Terrain and Climate. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 19, 1946, pp. 64-66.

The swamps of the sinking Orinoco delta in Venezuela are underlain by thick sediments in a deep geosyncline. Traces of petroleum appear in seeps, asphalt lakes, and the oil wells at Pedernales. The principal producing area of Trinidad is only 9 miles from the delta.

The Richmond Exploration Co. has been conducting seismic reflection urveys in the northwestern part of the delta with the use of tugs, launches, arges, wind boats, and marsh buggies. The shooting is done at a depth of 75 o 200 feet over a network of straight lines. Because of difficult terrain, nly 4 to 6 spreads can be accomplished in a day, each requiring 2 to 3 shots. erial photographs from a former survey facilitate the work. The results ppear to be promising. - V. S.

860. Riznichenko, Iu. V. Method for Transforming Space in the Seismics of Continuous Media. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 123.

A method is offered for interpreting the seismic data gathered from heterogeneous and anisotropic media. It comprises reducing such problems to simpler cases in a homogeneous isotropic medium, accomplished by means of certain transformations of space the common feature of which is maintaining the tensor of curvature equal to zero. The transformations can be either isotropic or anistropic. As an example, the method is applied to the calculation of velocities in the Baku oil region. (Inst. Theor. Geophys., Moscow.) - V. S.

8861. Rothé, Edmond. Les tremblements de terre: Leurs causes, leur effets. (Earthquakes: Their Causes and Effects.) Bibl. Philos. Sci., Paris, Flammarion & Co., 1942, 242 pp.

This monograph discusses in popular language the nature of earthquakes and the present state of seismology. The contents cover such subjects as basic and accidental causes of earthquakes, constitution of the globe; isostasy and orogeny, vulcanism and seismology, macroseismic observations, seismic sounds, relation of seismology to deep geological structure and to the other geophysical sciences, etc. An extensive bibliography is given. - V. S.

8862. Savarenskii, E. F. Concerning the Determination of an Epicenter. (Abs., in Russian.) Akad. Nauk SSSR, Otd. Fiz.-Mat., Referaty za 1943-44, Moscow, 1945, p. 95.

An analysis is made of the determination of the time of occurrence of an earthquake and of the geographical coordinates of its epicenter. The only data employed are the absolute arrival times of the first phase P at three stations. (Published in Trans. Seismol. Inst., Moscow, No. 117.) - Transl. by V. S.

8863. Vening Meinesz, F. A. De theorie van Wegener. (The Theory of Wegener.) Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap, Leiden, vol. 41, No. 4, 1939, pp. 453-457.

The article contains a compilation of the geophysical and geological aspects of the theory of Wegener. The seismological investigation of the velocity of propagation of earthquake waves has proved that only beneath the great ocean is this velocity greater than on the continents. Gravity investigations have given indirect support to the theory. Geophysical knowledge at this time is not sufficient to justify the reputation of the conception of Wegener. - J. F. S., Dominion Observatory, Ottawa, Bibliography of Seismology, No. 19, 1946, p. 324.

8864. Weinstein, D. H. Optics of Recording Oscillographs. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 462-465.

The results of A. C. Hardy are applied to show how one can favorably influence the size and shape of a galvanometer mirror to either increase the illumination or decrease the moment of inertia of the mirror without loss of illumination. This applies only to cylindrical systems. It is based on the fact that for maximum illumination, the cylindrical lens in front of the recording paper is focused on the galvanometer mirror which, accordingly, does not act as a stop in the vertical direction. Therefore, the illumination of the galvanometer spot is independent of the mirror height, but depends only on the mirror width.

However, the height of the galvanometer spot on the paper is reduced with reduction in mirror height, so that it becomes necessary to compensate for this by increasing the focal length of the cylindrical lens. The limitations of this procedure and the bearing of the above considerations on timing line intensities are discussed. Attention also is devoted to the illumination of the galvanometer spot on the recording paper of an oscillographic camera. It is shown how one can increase the illumination for a given moment of inertia of the galvanometer mirror, or how the illumination can be maintained with a decrease in the moment of inertia. - Author's abs., abridged by V. S.

4. ELECTRICAL METHODS

8865. Aerial, Geological, and Geophysical Survey of Northern Australia. Geophysical Survey of Lolworth Goldfield, Queensland. Report for period ended 31 December, 1940, Canberra, 1942, pp. 70-73.

The Lolworth field is situated 70 miles to the west of Charters Towers. An electrical potential-ratio survey was made of that portion that lies around the Mons-Meg and Midas mines. A preliminary investigation in 1936 had resulted in the recommendation for testing two places, and in one of these an auriferrous formation was exposed by trenching. The recent and more detailed survey gave an east-west trending pattern of conductive and resistive indications. Some of the conductive indications are due to narrow veins of sulphides and others to weathered basic dykes in an east-west system of master joints, veins, and fissures. Some of the resistive indications arise from weathered dykes and possibly from quartz reefs. The greisen bodies give o conductive indications in some cases. No cross-joints or fissures were evealed. Testing of some of the conductive indications is regarded warnted. - Abs., Report, p. 7.

366. Bains, T. M., Jr. Will Radar Aid Our Ghost Camps? Min. Jour., Phoenix, Ariz., vol. 29, No. 6, 1945, pp. 7-9.

A thorough geophysical survey of the Spread Eagle claim in the Whitlock istrict of Mariposa County, Calif., is being conducted by the Fisher Research aboratory, manufacturer of M-Scopes. These instruments are a modification of he radar sets used by the United States Signal Corps. - Author's abs.

367. Baker, J. S., and Miner, K. H. Some Aspects of the Mathematical Interpretation of Electric Logs. Tomorrow's Tools - Today, Los Angeles, vol. 12, No. 2, 1946, pp. 29-30.

The development of "passed-up" sands and their production problems have nlarged the scope of the electric log. The factors and conditions that overn the application of an electric log to such problems are discussed here. he mathematical interpretation of electric logs may be considered a new echnique, and among its more important applications is the solution of eservoir evaluation problems. - Authors' abs.

868. Bays, C. A. Use of Electrical Geophysical Methods in Groundwater Supply. Illinois Geological Survey, Urbana, Circular 122, 1946, 35 pp.

The methods and applications of electrical resistivity surveys and well-ogging surveys to ground water problems in Illinois are outlined. Considera-ion is given to field procedures, results, and modes of interpretation. It s found that the resistivity surveys have greatly reduced the amount of equired test drilling and have uncovered many new sources of supply that ould not have been detected otherwise. Logging surveys have yielded new eological data on wells, broadening the basis for future exploration. - V. S.

3869. Chemical Engineering and Mining Review. Limitations of Geophysical Prospecting. Melbourne, Australia, vol. 38, No. 450, 1946, p. 187.

From 1928 onward, several geophysical organizations have conducted exploration for mineral ore in Australia and found promising indications. But the tests of these indications by drilling usually were delayed, so that the geophysical claims went unchecked. Now a report is published by E. Broadhurst on the Wallaroo-Moonta copper mines, which summarizes both the electrical surveys and the boring results (Geoph. Abs. 126, No. 8709). Significantly, this area has been favorably reported by all the electrical and geological surveys made at various times. However, boring operations at the selected sites detected no ore. Such results point to the limitations of geophysical prospecting in ore finding. Doubtless, the methods are of great value in the case of large sulfide ore bodies lying close to the surface. But, generally, the many factors involved, such as the presence of salt water, changes in rock characteristics, and alterations in structure, necessitate much caution in the interpretation of results. - V. S.

8870. Fisher Research Laboratory. The M-Scope, a Tool for the Mining Industry. Palo Alto, Calif., 14 pp.

The Metallascope (M-Scope) introduces into the earth a symmetrical field of electromagnetic radiation by means of a transmitter loop consisting of numerous turns of wire placed vertically. A sensitive directional loop is used for reception and is adjusted for normal electromagnetic balance. When a metal or metallic sulfide or other mineral more electrically conductive than the surrounding rocks enters the primary electromagnetic field, a secondary field is induced, which distorts the primary field and disturbs the originally balanced circuit. The amount of disturbance depends on the mass, depth, and degree of mineralization of the ore body, and it registers on a meter and in the earphones of the receiver unit. A light portable model and a heavier coupled model of the Metallascope are described and the field techniques are explained. - V. S.

8871. Furnival, G. M., and Tovell, W. M. Structure Drilling in Oil Exploration, Southern Alberta. Canadian Min. & Metal. Bull., Montreal, No. 403, 1945, pp. 726-744.

About 270 boreholes were drilled in the plains of southern Alberta during 1943-45 to determine the structure of underlying sediments. Exploration covered an area of nearly 1,800 square miles and revealed Cretaceous sandstones and shales whose geology is discussed. The drilling was accompanied by electrologging made by means of the potential-impedance single point method. Potentiometers and ammeters indicated the change in self-potential and resistivity as the electrolog passed through a hole. Samples of curves are given.

The correlation of strata by the electrolog proved difficult in the case of lenticular sandstone beds, but satisfactory for marine shales with beds of concretionary siltstone and bentonite. Siltstone gave a high resistivity peak on the curve, and bentonite a depression. Other observations are indicated. Where correlations were based on sufficient data, the total error in the determination of the elevation of a formation apparently did not exceed 10 feet. - V. S.

8872. Gorman, L. J. Electrolysis Surveys on Underground Cables. Corrosion, Houston, Tex., vol. 1, No. 4, 1945, pp. 163-177.

A summary is presented of the survey methods and test analyses employed by the Consolidated Edison Co. of New York to evaluate the severity of orrosion of its electrical cables. The principal causes of corrosion are lassified as direct chemical attack, stray-current electrolysis, galvanic ttack, and electrolytic process due to environmental conditions.

Environmental types of electrolytic cells produce about 65 percent of orrosion on cables. Among the electrolytic surveys and tests devised for etection, the most advanced is the duct survey used to investigate the electrolytic conditions existing in duct sections between manholes. A test lectrode is pulled through a vacant duct installed near the ducts that carry able. Instruments are connected between this electrode and the lead sheath f the adjacent cable, and measurements of electrical potential, current, and esistance are made at frequent intervals throughout the duct. The characeristics of the record indicate whether existing processes are due to an xternal source of potential or to an electrolytic cell condition set up by ariations in the environment. Particulars of the procedures and instructions or optimal results are given. The analysis of the data on electrolytic conitions is illustrated by results of surveys made over a period of 4 years. - V. S.

8873. Lee, F. W., Scharon, H. L., and Sandberg, C. H. Prospecting for Mineralization in Steeply Dipping Beds Covered by Glacial Till, Talus, and Weathered Zones. U. S. Bureau of Mines, Washington, D. C., Tech. Paper 694, 1946, 19 pp.

An electrical prospecting technique has been described, which also has been tested in the field for prospecting for mineral deposits covered by glacial till, sediments, and volcanics. Details of the method of applying this technique have been explained and discussed. This method differentiates the electrically isotropic conducting material from the anisotropic conducting material. It further permits the measurement of the strike of the buried beds and separates the beds into different classes according to their electrical conductivity. Results of field tests in the Kirkland Lake area of Canada and in the Newtown Flats area of California are a part of this report. - Authors' abs.

8874. Mining Record, Denver, Colo. M-Scope Directed Workers to Ore. Vol. 56, No. 46, 1945, p. 3.

An electromagnetic survey recently conducted at an abandoned mine near Silver City, N. Mex., has detected zinc-lead ore. The instrument used was a new model of G. Fisher's Metallascope employing a radio-frequency field. When the electromagnetic balance of this field is disturbed by a body of different electrical conductivity, the apparatus registers a deviation and gives visual and auditory signals. Measurements at the mine resulted in the discovery of a 14-foot vein and other strikes. (See also Geophys. Abs. 126, No. 8715.) - V. S.

8875. Romanoff, Melvin. Progress Report on the Behavior of Zinc-Iron Couples in Soil. Corrosion, Houston, Tex., vol. 1, No. 2, 1945, pp. 95-102.

In order to study the effectiveness of zinc for the cathodic protection of iron and steel under various soil conditions, zinc-iron couples were buried at eight test sites in 1941. The electrical-measurement data presented refer to (1) the current flowing in the galvanic circuit; (2) the potential of each electrode to a copper-copper-sulfate electrode after opening all circuits for 1 hour; (3) the voltage of the couple; and (4) the current required for cathodic protection of the iron rings. The couples from two sites have been removed and examined. One of these showed moderate protection and the other almost complete protection. A possible explanation for the different results at the two stations is offered. - Corrosion, vol. 1, No. 3, 1945, Abstracts, p. 21.

8876. Westman, B. J. Geophysical Surveying Followed by Diamond Drilling. California Min. Jour., Auburn, vol. 16, No. 2, 1946, p. 14.

Brief remarks outline the principles and advantages of the resistivity and natural-potential methods of electrical prospecting for minerals. Examples of prospecting combined with geological investigation and diamond drilling, as practiced in Canada, are cited in support of recommendations for application in California. - V. S.

5. RADIOACTIVE METHODS

8877. Barbour, W. E., Jr. A statistically Accurate Scaling Method for Radioactivity Measurements. Instruments, Pittsburgh, Pa., vol. 19, No. 10, 1946, pp. 584-585.

The conventional method of measuring radioactive emanations comprises counting the impulses received during a period of time, dividing by the time, and computing the statistical error with formulas or charts. A new method is offered utilizing a different procedure: Impulses from the Geiger-Müller counter are fed to a preamplifier, a two-stage amplifier, and a multivibrator, which triggers the first of a series of twelve "scale-of-two" counter circuits. The latter can be selected by a switch to provide a predetermined number of impulses in integral powers of 2. Thus, the measurement of an average counting rate is made by timing a finite number of random impulses, and the statistical error can be determined for the total number of impulses timed.

A chart shows the statistical error as a function of the ratio of the total counting rate to the background counting rate plotted for different settings of the scale-selector switch of the apparatus. - V. S.

8878. Campbell, J. L. P., and Samuell, J. H. Pre-Permian Radioactivity Surveys in West Texas and New Mexico. Tomorrow's Tools - Today, Los Angeles, Calif., vol. 12, No. 3, 1946, pp. 20-23.

By combining the information furnished by the gamma ray and neutron curves, reliable subsurface data can be obtained under unfavorable conditions that preclude the use of other means without expensive preparatory work. The employment of both curves in radioactivity logging operations in west Texas and New Mexico is here discussed. - Authors' abs.

8879. Curtiss, L. F., and Brown, B. W. An Arrangement with Small Solid Angle for Measurement of Beta Rays. Jour. Res. Nat. Bur. Stand., Washington, D. C., vol. 37, No. 2, 1946, pp. 91-94.

An arrangement using a Geiger-Müller counter with small aperture, with a radioactive source at some distance from it, for counting beta particles is described. Sources emitting only beta rays with maximum energies above 1 million electron volts of the order of 1 milli-curie can be measured in terms of the disintegration rate from the observed counting rate and the solid angle as calculated from the dimensions of the apparatus. An independent check of the arrangement shows that this can be done reliably. A suggestion for discarding the use of the curie and substituting a unit consisting of 10^6 disintegrations per second, to be called the "rutherford," is made. The curie is properly applicable only to members of the radium family. - Authors' abs.

8880. DeMent, Jack. Locating Uranium with the Ultraviolet Lamp. Min. Congr. Jour., Washington, D. C., vol. 32, No. 5, 1946, pp. 26-30.

The ultraviolet lamp is proving useful in uranium prospecting. It has led to the discovery of deposits of uranium, zippeite, schoepite, dakeite, and opaline silica. Generally, the primary uraninites imbedded in pitchblende and the columbium-titanium tantalates are nonfluorescent, but the secondary uranium minerals emit a brilliant glow. As the latter ores are frequently associated with the primary minerals, this differentiation can lead to their discovery. The various uranium minerals and the fluorescent tests for identifying them are discussed. - V. S.

8881. Hée, A. Effet d'épaisseur du thorium dans les roches. (The Effect of the Thickness of Thorium in Rocks.) Ann. Géophys., Paris, vol. 2, No. 1, 1946, pp. 55-67.

A study of the effect of the thickness of thorium-bearing substances and rocks upon electrometer measurements could assist in the interpretation of the results of radioactive surveys. Investigations made for various purposes have shown that this effect may serve for determining the presence of thorium in rocks, though not its amount. It is found, moreover, that some constituents of rocks, such as Fe components in certain chemical form, facilitate emanation and affect the accumulation of radioactive substances. Accordingly, preliminary measurements of emanation from rocks and their constituents likewise would aid interpretation. - V. S.

8882. Kilkenny, J. E. Geological Interpretation of Radioactivity Well Logs (abs.) Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 25, 1946, pp. 110-125.

The nature of radioactivity and its varieties, such as alpha, beta, and gamma rays, are discussed. Gamma rays, being the most penetrating, provide the best means of detecting radioactive formations in boreholes. It is found that among sedimentary rocks the brown organic shales, rhyolitic ashes, and bentonites usually give high values, whereas sands, limestones, barren silts, and shales give low values.

Some results inthe San Joaquin Valley, California, show, however, that the brown Kreyenhagen shales in the Coalinga and Helm oil fields can yield low radioactive values, possibly because of derivation from Franciscan rocks composed of basalt and serpentine. On the other hand, sporbo and phosphatic nodules in the basal Etchegoin beds of the Cymric oil field prove radioactive and register distinctly on logging curves. - V. S.

8883. McKellar, I. C. An Alpha-Ray Ionization Chamber for Radioactivity Measurements. New Zealand Jour. Sci. & Tech., Wellington, vol. 27B, No. 3, 1945, pp. 259-262.

A description is given of a semiportable ionization chamber serving to check field readings made in prospecting with the counting rate meter of McCahon (see Geoph. Abs. 125, No. 8560). For this purpose, measurements are made of total alpha-ray emission from the surface of sand or powdered rock samples. The apparatus employs a Lindemann electrometer with a fiber suspension connected to an electrode running along the center of an aluminum chamber. When a negative potential of 60 volts is applied to the outside of the chamber, while two nearly equal voltages of opposite sign are applied through high resistances to the electrometer's plates, the electrometer acts as a sensitive measurer of small changes of voltage on the central electrode.

For measurement, the samples are placed on an aluminum tray in the chamber, so as to ionize the air between the central electrode and the walls. The negative potential employed sweeps all positive ions to the walls before recombination can take place and produces a current causing a change of voltage on the central electrode that can be measured by the rate of movement of the electrometer needle. The construction of the ionization chamber and the method of measurement are described. - V. S.

8884. McLellan, A. G. Construction of Self-Quenching G-M Tubes. New Zealand Jour. Sci. & Tech., Wellington, vol. 27B, No. 3, 1945, pp. 263-265.

A Geiger-Müller tube was designed for service with the portable counting-rate meter developed by McCahon for radioactive prospecting (see Geoph. Abs. 125, No. 8560). With such requirements in view, a use was made of the fast, self-quenching type of tube, which is relatively unstable and affected by temperature but gives a plateau of as much as 250 volts. The tube contains argon and ethyl alcohol or helium and ethyl alcohol. The cathode is made of thin copper sheet fitting in a glass tubing measuring 0.75 inch in diameter. The central fiber and the lead from the copper cathode consist of 250 micron tungsten wire, the lead being pressed between the cathode and the inner glass surface.

The treatment of the copper cathode and the conditions of temperature and pressure necessary to prevent condensation of the alcohol are discussed. It is calculated that the number of pulses required to reduce the partial pressure of ethyl alcohol from initial to that least compatible with quenching is 2.5 x 10^8. Accordingly, at the normal rate of 150 counts per minute the tube should serve for 3 years of continuous operation. - V. S.

8885. Mercier, V. J. Radioactivity Well-Logs: Interpretation and Application. Oil Weekly, Houston, Tex., vol. 123, 1946, No. 7, pp. 56-60; No. 8, pp. 41-46.

The nature, application, and interpretation of radioactivity logs are discussed in the light of comparisons with electrical and other logs and examples of log curves and cross sections. Topics treated include gamma-ray curves, neutron curves, combination radioactivity logs, correlation with various types of data, relative accuracies, and general principles of logging. To aid interpretation, a schematic type log is given showing the characteristic responses of both the gamma-ray curve and the neutron curve to various types of strata encountered progressively from the surface down to the pre-Cambrian.

The applications of radioactivity logs include (1) locating cased-off strata, porous formations, permeability zones, physical features of wells, and radioactive additives such as carnotite and tracers; (2) clarifying uncertain anomalies, tops and bottoms of formations, and drill-pipe measurements; and (3) providing data for geological correlation. - V. S.

8886. Muehlhause, C. O., and Friedman, H. Geiger-Müller Counter Technique for High Counting Rates. (Abs.) Phys. Rev., Lancaster, Pa., vol. 69, Nos. 1/2, 1946, p. 46.

Counting rates of 100,000 per second have been measured with a self-quenching G-M counter operated at 50 to 100 volts above threshold. The counter was coupled to a video amplifier having linear response to four megacycles per second and a maximum gain between 10^3 and 10^4. The amplified pulses were counted by a scaling circuit capable of responding to uniform pulse rates up to two megacycles per second.

The triggered-sweep oscilloscope method devised by Stever to measure "dead time" was applied to the present combination of counter and amplifier. At amplifications under 10, a dead-time interval of 3 x 10^{-4} second was observed, in agreement with Stever's results. At higher amplifications, the dead-time pattern persisted, but pulses were observed within the dead-time interval. These latter pulses arise from impact ionization in the reduced fields that exist immediately following the formation of a positive ion sheath and make possible the high counting rates observed.

8887. Pettersson, Hans. Manganese Nodules and the Chronology of the Ocean Floor. Göteborgs Kungl. Vetenskaps och Vitterhets-Samhälles Handlingar, ser. B, vol. 2, No. 8, 1943, 43 pp.

During the past 30 years the author investigated Joly's precipitation hypothesis and its implications as to the chronology of the ocean floor. The content of radium and related elements in ocean sediment-cores, manganese nodules, and sea water was measured. The results on the nodules are presented in tables and curves and are discussed. The following principal conclusions are reached: (1) The radium content in manganese nodules declines rapidly inward from the surface owing to disintegration of radium unsupported by its parent element ionium. (2) If the disintegration constant of radium is used as a measure of time, the rate of growth of the nodules is, on the average, 1 mm. in 1,000 year; the rate of sedimentation for samples of Red clay is about 0.5 mm. in 1,000 years. - V. S.

8888. Rada, F. D., de. Conferencias de radioactividad. (Lectures on Radioactivity.) Rev. Geofis., Madrid, vol. 4, Jan.-Mar. 1945, pp. 102-131.

This elementary course on radioactivity oulines the historical development of investigation, methods of measurement, determination of the radioactivity of mineral waters, and the numerical results of the measurement of certain Spanish mineral springs. - Bull. Analyt., CNRS, Paris, vol. 7, No. 6, pt. 1, 1946, p. 1053. Transl. by V. S.

Zeuner, F. E. Dating the Past: An Introduction to Geochronology. London, Methuen & Co., 1946, 444 pp. Price, $6.90. (See abs. 8937 in this issue.)

6. GEOTHERMAL METHODS

8889. Guyod, Hubert. Temperature Well-Logging: Heat Conduction. Oil Weekly, Houston, Tex., vol. 123, No. 8, 1946, pp. 35-40.

At present, temperature logs are used for locating oil and gas reservoirs in cable-tool wells, but an understanding of their possibilities could lead to broader application. Toward that end, the laws of heat conduction are compared with those of hydrodynamics and electrodynamics, in the light of the conductivity of substances and sediments. As a result, a method is devised for studying temperature distribution in the earth's crust by means of electrolytic scale models, in analogy with investigations of the performance of petroleum reservoirs.

In cases of formations with known spatial and thermal characteristics, the models must constitute close geometrical replicas and consist of elements with an electrical-conductivity ratio equal to the thermal-conductivity ratio of corresponding elements of the ground. The underlying assumptions are that electrical flow through conductors simulates heat flow through the earth's crust, and that potential distribution in the model simulates temperature distribution in the ground.

This method was applied for studying the influence exercised upon temperature distribution by salt domes, salt ridges, formation dip, superficial relief, petroleum reservoirs, ore deposits, faulting, and intrusions with low heat conduction. The construction of models and the organization of experiments are described. - V. S.

8890. Nichols, E. A. Geothermal Gradients in Mid-Continent and Gulf Coast Oil Fields. Petrol. Technology, New York, vol. 9, No. 6, 1946, AIMME Tech. Publ. 2114, 4 pp.

An attempt has been made to correlate geothermal gradients over considerable parts of the mid-continent and Gulf-coast regions. Approximately 1,800 measurements in 194 oil fields provided the data. They were made with maximum thermometers in conjunction with running pressures or taking reservoir fluid samples after the wells had been shut from 1 hour to 10 or 12 days, so that they represent thermal conditions found in producing wells. The resulting map is given and can serve for estimating temperatures.

The study has led to the following conclusions: (1) The region of New Mexico and western Texas is characterized by a low gradient basin; (2) near Matagorda Bay a plateau of high temperatures appears, but elsewhere along the coast the gradients increase inland; (3) above the coast on the Texas-Louisiana boundary a sharp change in gradients is evident, culminating in a high plateau near Beaumont; and (4) in the general vicinity of the Sabine uplift a large and irregular basin is apparent. (A digest appeared in Oil & Gas Jour., vol. 45, No. 22, 1946, p. 88.) - V. S.

7. GEOCHEMICAL METHODS

8891. De Ment, Jack. Black Light and Bacteria - New Tools for Petroleum Prospecting. Mineralogist, Portland, Oreg., vol. 13, No. 11, 1945, pp. 425-427.

Deep petroleum deposits give off emanations of hydrocarbon gases, which diffuse upward and are assimilated by certain bacteria in the ground. This process results in a deposition of fluorescent substance in the surface soil over the deposits. A new method of prospecting has been devised recently to make use of this phenomenon. Samples of the soil in the surveyed area are analyzed for the presence of certain kinds of bacteria and for fluorescent properties. If sampling is made with solvents, very accurate tests are possible. L. W. Blau obtained patent rights for the bacterial analysis (Geoph. Abs. 117, No. 7492). The fluorescent analysis has been described by the author elsewhere in greater detail (Geoph. Abs. 125, No. 8569). - V. S.

8892. Gabriel, V. G. Geochemical Prospecting. Petrol. World, Los Angeles, Calif., vol. 43, No. 9, 1946, pp. 52-53.

In the search for oil, the initial principle employed was to look for surface seepages. Most of the pools discovered before 1900 were found near oil seepages or asphalt deposits. As examples, the Ventura, Sulphur Mountain, Coalinga, McKittrick, and Los Angeles pools in California are described. The modern method of geochemical prospecting applies the same principle of seepage but uses refined techniques and apparatus for identifying microseeps of hydrocarbon gases. Soil samples are taken at relatively shallow depths, not exceeding a few feet, to be analyzed in laboratories for diagnostic hydrocarbon constituents, concentration, ratio of weights, pattern of distribution, inorganic solids, etc., or else the rate of upward hydrocarbon drift through the soil is measured by means of special instruments in the ground. The approaches employed by Horvitz, McDermott, Rosaire, Smith, Pirson, Hoover, Washburn, and others are outlined briefly. - V. S.

8893. Mining Journal. Novel Russian Method of Prospecting for Oil. London, vol. 227, No. 5,799, 1946, p. 813.

In 1945, Russian geologists organized an expedition to the Stavropol region in the northern Caucasus to prospect for gas by a new bacterial method. A brief note reports that geochemical research before the war had led to identifying certain hydrocarbon bacteria invariably present in surface soils over petroleum and gas deposits but absent in other localities. Upon the basis of the findings then obtained, a method of prospecting was developed. When applied by the Caucasian expedition, it detected a gas deposit of commercial value at a depth of 682 feet near the village of Mikhailovskoo. - V. S.

8894. Van Tuyl, F. M., et al. Geochemical Prospecting (1945). Quart. Colorado Sch. Mines, Golden, vol. 41, No. 3, 1946, pp. 68-71.

The papers and patents published on geochemical prospecting during 1945 are reviewed briefly. They include the writings of Pirson, Horvitz, Bronson, Gabriel, Tripp, West, and the inventions of Hassler, Bies, Paton, McDermott, Zaikowsky, Metcalf, Roper, Horvitz, etc. Instances of new observations, broadened approaches, and modifications of previous methods are indicated. - V. S.

8. GENERAL GEOPHYSICAL SUBJECTS

8895. Bates, R. L. Developments in Arizona, Western New Mexico, and Northern New Mexico in 1945. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 6, 1946, pp. 958-962.

In describing petroleum developments in Arizona and New Mexico, the author dwells briefly on the geological and geophysical work. Throughout 1945 and continuing into 1946, extensive geophysical exploration was carried on in the San Juan basin, New Mexico. It consisted of seismic, magnetic, and torsion-balance surveys and was aimed particularly at determining the possibilities of the Paleozoic limestones at great depths. A considerable drilling campaign is expected. - V. S.

8896. Bonine, C. A. Exploration for Petroleum and Natural Gas. Pennsylvania State College, School of Mineral Industries, "Petroleum and Natural Gas Production," vol. 2, 1946, pp. 170-201.

The textbook by M. Stephens and O. Spencer on petroleum and natural-gas production contains a section by C. Bonine on exploration. The latter covers surface indications, geophysical, geochemical, and logging methods, and geological interpretation. Attention is devoted particularly to electrical, magnetic, gravitational, and seismic prospecting. The other subjects considered are seepages, outcrops, hydrocarbon veins, mineral waters, gas and soil analyses, electrical and other logs, stratigraphic correlation, and structural interpretation. The treatment is aimed primarily at preparing students for work in Pennsylvania. - V. S.

8897. Borden, J. L. Developments in Oklahoma in 1945. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 6, 1946, pp. 902-911.

This account of petroleum work in Oklahoma during 1945 includes a brief summary of the use of geophysical methods. Such use increased both in amount and range, comprising seismic, gravitational, magnetic, and radioactivity surveys. Total performance amounted to 772 crew months as against 559 for 1944, a gain of 38.3 percent. Seismic work alone increased 163 crew months, or 35.6 percent; gravimetric work increased 35 crew months, or 48.6 percent. A table gives the statistics of exploration reported for 1941 through 1945. - V. S.

8898. Centre National de la Recherche Scientifique, France. Bulletin Analitique. (National Center of Scientific Research. Analytical Bulletin.) Service de Documentation du CNRS, Paris, pt. 1, 1939+.

This monthly periodical is an annotated bibliography of scientific literature appearing in various countries. It is published by the French ministry of education through the documentation service of the National Center of Scientific Research. Some subdivisions contain entries on geophysical exploration and related subjects, in particular the sections of Physics of the Globe, Electricity and Magnetism, and Geology (including Applied Geology). The entries are made in the original language and in French, with French notations. They have numbers serving for identification in ordering microfilm copies of full texts made by the documentation service at stated prices. The service also undertakes to supply microfilms of texts published prior to the founding of the Bulletin Analytique in 1939. - V. S.

8899. Davis, D. M., and Beilharz, C. F. Developments in the Upper Gulf Coast of Texas in 1945. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 6, 1946, pp. 991-998.

The petroleum developments on the upper Gulf coast of Texas in 1945 included geophysical exploration. A brief summary of the latter work shows activities totaling 1,640 crew weeks, a decline of 8 percent from 1944. Seismic exploration alone amounted to 1,347 crew weeks, a decrease of 5.2 percent; gravity exploration to 293 crew weeks, a decrease of 19.3 percent. However, most of the new-field wildcats resulting in new discoveries were drilled on seismic prospects. In Colorado County, 6 out of 8 such wildcats revealed gas-condensate fields. Geophysical activity was distributed more or less evenly over the entire upper Gulf coast. - V. S.

8900. Dawson, Herbert. The Planning of a Foreign Geophysical Operation. Geophysics, Tulsa, Okla., vol. 11, No. 4, 1946, pp. 435-442.

The advance preparation necessary for a properly conducted foreign geophysical operation is discussed, with reference also to the economic facts involved that emphasize the necessity of having proper equipment and an efficient supply system. - Author's abs.

8901. Day, A. H. Continuing Search for Oil in Britain. World Petrol., New York, vol. 17, No. 10, 1946, pp. 47-49.

This account of oil search in Britain includes brief references to the use of geophyscical methods. Seismic surveying contributed a part of the evidence which lead to the discovery of the Eakring oil fields in Nottinghamshire in 1939. Various geophysical methods combined with geological study were employed in Yorkshire and Midlothian, with discoveries in the latter district. Geophysical work revealed a dome in the peat country at Belton, Doncaster, which contained light oil, though not in commercial quantity. At present, geophysical surveys are in progress in Wiltshire, Dorset, and Hamshire, including parts of Salisbury Plain and the New Forest. From a commercial angle, the various results to date do not appear to justify the expense. - V. S.

8902. Dresbach, C. H., and Weaver, Paul. A Review of Geophysical Methods, Devices, and Procedures. Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 26, 1946, pp. 79-81.

In every part of the United States where oil fields exist, geophysical prospecting has been tried. The choice of territory to work was at first geographic. In most regions no attention was paid, at the beginning of the campaign, to the suitability of the geophysical method tried for the kind of structure that was most promising for oil, and therefore the initial campaign in many areas resulted in disappointment.

In the Gulf Coast, where the initial campaign was for a plug structure, the salt dome, and where the methods used were suitable to plugs, gravity, and refraction seismograph, the finding rate was high, and the campaign therefore expanded continuously. In other oil-producing areas, a successful campaign was firmly established only when the geophysical method utilized was particularly useful for the kind of local structure in which oil chances were best. - Authors' abs.

8903. Eby, J. B. The Status of Geophysics. (Abs.) Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, p. 418.

Geophysical exploration has advanced steadily and successfully since its introduction in this country in 1923 to the present time. It was during the first decade that the exploration program was divided nearly equally between the larger oil companies and the larger independent geophysical organizations. During the second decade, 1933 to 1943, there was a very pronounced tendency to increasingly subdivide the largest geophysical organizations into many small independent exploration companies. This tendency for experienced geophysicists to branch off from the larger oil company staffs and of the larger geophysical organizations to form their own companies existed until about a year or so ago.

At present there is, in the writer's opinion, a need for greater consolidation of geophysical thinking and organization rather than further breaking apart into smaller and smaller exploratory units. The time has come when more and more cooperation is urgently needed to advance the science as a whole. Some way should be devised whereby the smaller, substantial, operating geophysical organizations would have a better opportunity of sharing in progressive research methods and equipment. If mistakes are made by the smaller organizations as a result of a lack of this contact, the damage done affects adversely not only the organization involved but the entire science of applied geophysics as well. - Abridged by V. S.

8904. Gabriel, V. G. Geophysical Prospecting Methods. Petrol. World, New York, vol. 43, No. 7, 1946, pp. 46-47.

The usefulness, proper application, and small per-barrel cost of indirect geophysical methods of exploration, magnetic, gravimetric, seismic, is discussed and illustrated by a few statistics. Brief mention then is made of the methods of direct oil detection: (1) geochemical, (2) electrical resistivity, Resistolog, Elflex, (3) radio and high-frequency, and (4) polarization at very low frequency, used by Potapenko. - V. S.

8905. Heroy, W. B. Foreign Geophysical Activities. Geophysics, Tulsa, Okla., vol. 11, No. 3, 1946, pp. 385-387.

Statistics on foreign geophysical exploration compiled by the U. S. Petroleum Administration for War are given for the second half of 1944 and the first half of 1945, with revised figures for 1944 (Geoph. Abs. 121, No. 8019). The data cover (1) Mexico, Central America, West Indies, (2) Caribbean region, (3) other South America, and (4) Eastern Hemisphere; they do not include Canada, Argentina, or Russia. The total number of crews rose from 122 in the second half of 1944 to 148 in the first half of 1945. The Western Hemisphere carried about 95.6 percent of the foreign activity, with 61.9 percent in the Caribbean and 19.8 percent in Mexico, Central America, and West Indies. About two-thirds of the investigations continued to be seismic and the rest almost entirely gravimetric. The activity in foreign countries in 1945 was approximately 13 percent of the activity in the United States, the latter having averaged 561 crews during each of the first two quarters of 1945. - V. S.

8906. Jung, Karl. Die geophysikalische Erforschung des Untergrundes. (The Geophysical Exploration of the Subsurface.) Natur, Volk, Frankfurt, vol. 10, October 1943, pp. 494-506.

Geophysical methods of exploration based upon measurements of gravity, geomagnetism, and electricity are examined with the aid of numerous and precise examples. Brief consideration is given to procedures making use of radioactivity and temperature in the earth. A bibliography is appended. - Bull. Analyt., CNRS, Paris, vol. 7, No. 4, pt. 1, 1946, p. 632. Transl. by V. S.

8907. Mining Journal, London. Submarine Oil Deposits. Vol. 227, No. 5,786, 1946, p. 553.

Pursuant to the presidential declaration claiming the continental shelf for the U. S. Government, the Secretary of the Interior has instructed the U. S. Geological Survey to make recommendations for a survey of the submerged areas, comprising a total of 750,000 square miles. The applicable geophysical approaches include magentic, gravimetric, and seismic methods. Surveys of submerged areas have been made already. The promising parts of the continental shelf are the Gulf of Mexico and areas off the Pacific and Alaskan coasts. - V. S.

8908. Petroleum Times. Oil Resources of the British Empire and Mapping by Radar. London, vol. 50, No. 1,283, 1946, pp. 1,008-1,010.

Brief reviews are given of papers on petroleum presented at the recent Empire Scientific Conference on Natural Resources held in London. (1) E. O. Macpherson in "Detailed Geological Mapping and New Zealand Mineral Resources" referred to geophysical exploration in 1939-43; gravity and seismic reflection surveys made in the three main sedimentary basins in combination with other studies revealed an entirely different structural picture from that supposed hitherto. (2) C. A. Hart in "Surveying from Air-Photographs Fixed by Remote Radar Control" and "Modern Mapping" described the use of radar aerial positioning techniques for establishing networks of fixed points on the ground, elative to which aerial photographs could be plotted in map making. Trial aps of some areas in Great Britain have been made by this method, and radar ontrols are now employed in aerial surveys in West Africa. - V. S.

8909. Schlumberger, R. A. Relations entre la tectonique et la morphologie de la plaine du Rhin en Alsace et au Grand Duché de Bade. (Relations between the Tectonics and Morphology of the Plain of the Rhine in Alsace and the Grand Duchy of Baden.) Bull. Soc. Géol. France, Paris, vol. 15, Nos. 1-3, 1945, pp. 69-80.

Different modes of investigation are described in their application to the tectonics and morphology of the valley of the Rhine in Alsace and the Grand Duchy of Baden. They include such studies as geological, geophysical, alluvial, morphological, aerial micrometeorological, and Hertz-wave transmission for identification of subsurface structures. A bibliography is appended. - Bull. Analyt., CNRS, Paris, vol. 7, No. 4, pt. 1, 1946, p. 632. Transl. by V.S.

8910. Science Museum, London. Quarterly Bibliography of Applied Geophysics. Science Library, Current Bibliography Series No. 1, 1938+.

The science library of the Science Museum, London, issues a Current Bibliography Series. Its first section since 1938 is devoted to a quarterly bibliography of applied geophysics, a mimeographed publication listing writings and patents from various countries, with their decimal classification. The entries give author's name, title of paper, source, and year of publication. - V. S.

8911. Standard of California. Through Water to Oil. San Francisco, Calif., vol. 32, Spring Bull., 1945, pp. 6-7.

Geophysical surveys have detected three oil fields in the swampy bayou country of lower Louisiana. In exploration, the California Company employed marsh buggies mounted on wheels of huge, air-tight, steel drums traveling on land and water and air boats driven by an airplane propeller at the stern and sliding undamaged over grass mounds, logs, and other obstacles. The drilling of wells is done from large steel barges sunk to a solid foundation. - V. S.

8912. Targhetta, J. B. La geofisica y su relacion con la geologia. (Geophysics and Its Relation to Geology.) Rev. Geofis., Madrid, vol. 4, Apr.-June 1945, pp. 208-218.

The application of modern geophysical methods in prospecting the subsurface is outlined, with indication of their superiority over mechanical sounding. Geophysical findings are compared with geological data in the light of some results obtained in Spain, particularly in the solution of structural problems. - Bull. Analyt., CNRS, Paris, vol. 7, No. 6, pt. 1, 1946, p. 1054. Transl. by V. S.

8913. Uren, L. C. Petroleum Exploration Methods, Well Logging Methods and Records. In the book by the same author: Petroleum Production Engineering, vol. 1, Oil Field Development, New York, McGraw-Hill Co., 1946, pp. 34-53, 618-666.

This book on oil-field development includes sections on geophysical exploration and well logging. Consideration is given to geological reconnaissance and surveying, aerial mapping, prospecting by gravimetric, magnetic, electrical, radioactive, and geochemical methods, drilling for subsurface information, electrical logs, radioactivity logs, geochemical logs, instrumental logs, drilling-time logs, caliper logs, and thermal surveys of wells. A bibliography is appended. - V. S.

8914. Ver Wiebe, W. A. Exploration for Oil and Gas in Western Kansas During 1945. Geol. Surv. Kansas, Lawrence, Bull. 62, 1946, 112 pp.

The amount of exploratory geophysical work done in 1945 was not as great as that reported for the previous year. Only a few of the 35 new pools found in western Kansas are credited to such geophysical work. Most of them were found by the intelligent application of subsurface data derived from other test wells. - Author's abs., abridged by V. S.

8915. Yacimientos Petroliferos Fiscales (Argentina). Memoria de Y.P.F. correspondiente al año 1944. (Annual Report of the Argentine Administration of Government Oil Fields for 1944.) Bol. Inform. Petrol. (YPF), Buenos Aires, vol. 22, No. 255, 1945, pp. 323-328.

The Argentine Administration of Government Oil Fields (Y.P.F.) has issued an annual report for 1944 containing a section on geological and geophysical exploration. Geophysical surveys were made in the provinces of Buenos Aires, Mendoza, San Juan, Rio Negro, Chubut, Neuquen, and Santa Cruz over a total area of 154,587 km^2. They covered, particularly, unexplored areas and employed gravimetric, magnetic, and seismic refraction methods; the detailed work was made by seismic reflection. The results are considered satisfactory, having revealed promising anomalies justifying further study. The material presented is organized by provinces. - V. S.

9. RELATED NON-GEOPHYSICAL SUBJECTS

8916. Aslakson, C. I., and Rice, D. A. Use of Shoran in Geodetic Control. Trans. Amer. Geophys. Union, Washington, D. C., vol. 27, No. 4, 1946, pp. 459-463.

A general description of the shoran equipment is given, with a discussion of the various factors that influence accuracy of a direct distance measurement made by determination of the travel time of a radio signal. The line-crossing method of observation is explained, and problems arising in the computation and adjustment of a shoran triangulation scheme are enumerated briefly. A table summarizes results obtained in recent accuracy test simulating field conditions to be found in the execution of geodetic control by shoran. - Authors' abs.

8917. Baldini, Ugo. In tema di allineamenti. (On the Subject of Alignment.) Metano, vol. 4, No. 15, 1942, pp. 5-11.

The hypothesis that oil and gas deposits usually are alined in linear fashion has lead to the discovery of a new gas reservoir near Mogginano, in Arezzo Province, Italy. This reservoir is situated on a straight line between the well-known deposits near Bagno di Romagna and Camerelle. - V. S.

8918. Beck, R. S. Highlights of Washington and Oregon Biostratigraphy. (Abs.) Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 27, 1946, p. 92.

The biostratigraphy of type and classical localities of Washington and Oregon is discussed. Special emphasis is given to the Astoria, Cowlitz, Olympic Peninsula, and Coos Bay basins. Strata from Devonian to recent are known from these areas and have a combined thickness of over 30,000 feet. Those basins, as well as others, are possible areas in which oil and gas might be discovered in the future. Favorable as well as unfavorable geologic conditions with regard to oil possibilities in the Pacific northwest are discussed.

8919. Canadian Legion. Prospecting in Canada. Educational Services, Mining Textbooklet 2, Ottawa, 1945, 166 pp. Price $1.

This vocational course in prospecting, published for service personnel as a part of a series on mining, deals in an elementary and practical fashion with questions of camp necessities, prospecting equipment, selection and exploration of an area, examination and development of a prospect, and special types of mineral and petroleum deposits. Among prospecting instruments, the dip needle and ultraviolet lamp are listed. A glossary and bibliography are appended. - V. S.

8920. Dutilly, Artheme. Bibliography of Bibliographies on the Arctic. Catholic Univ., Washington, D. C., 1945, 47 pp. Price $1.

This bibliography of bibliographies deals with the Arctic, defined as the region circumscribed by the 10° C. (50° F.) isotherm for July, which corresponds to the limit of forests rather than to the Arctic Circle proper (66° 30' N.). The material consists of some 650 entries in English, German, French, Russian, Swedish, etc., and covers, among other subjects, geology, cartography, and oceanography. Two accessory lists are appended to facilitate finding entries: (1) Arctic Sectors and Districts, and (2) Prominent Names in Arctic Exploration. - V. S.

8921. Gross, H. E. Possibilities and Problems of Drilling Beyond the Continental Shelf. Petrol. Technology, New York, vol. 9, No. 6, 1946, AIMME Tech. Publ. 2095, 7 pp.

An abstract appeared in the Oil & Gas Journal, Tulsa, Okla., vol. 44, No. 43, 1946, pp. 57-58. (See Geoph. Abs. 125, No. 8602.)

8922. Illing, V. C. Geology Applied to Petroleum, pts. 1-5. Oil Weekly, Houston, Tex., vol. 122, 1946, No. 7, pp. 34-36, 42, No. 13, pp. 30-33, 37; vol. 123, 1946, No. 1, pp. 27-30, No. 3, pp. 174-176.

This discussion of the role of geology in petroleum exploration comprises four installments: (1) Petroleum in the Sedimentary Cycle treats of the origin of petroleum, phases of sedimentation, effects of diastrophism, accumulation of oil, and the anticlinal theory. (2) Types of Regional Structure describes the trapping of oil, areas of closure, faulting and thrusting, oil fields associated with salt domes, and oil fields of unusual types. (3) Oil Recovery and Exploration deals with prospecting methods, oil dispersal, oil recovery, and geology in exploitation. (4) Finally, Influence of Oil on Geology is concerned with the quantitative approach, geologic forms related to oil, development of applied geophysics, advances in geological methods of oil exploration, etc. - V. S.

8923. Jenkins, D. S., et al. The Origin, Distribution, and Airphoto Identification of United States Soils. Civil Aeronautics Administration, Tech. Develop. Rep. 52, 1946, 202 pp., 63 airphoto plates.

The soils of the United States are examined with a view to developing information and airphoto techniques for soil identification in engineering work. The types of soils and materials studied include residual, loessial, glacial, and waterlaid, as well as nonsoil types. Attention is then devoted to the principles of airphoto analysis and interpretation as applied to the classes of soils and such of their subdivisions as sedimentary rocks, metamorphic rocks, intrusive rocks, extrusive rocks, loess, sand dunes, moraines, tilt planes, etc. The discussion of techniques of airphoto analysis is illustrated by 63 plates of aerial photographs of soils. - V. S.

8924. Krug, J. A. Federal Policy on Petroleum Exploration and Conservation. U. S. Department of the Interior, Office of the Secretary, mim. text, 1946, 8 pp.

The Secretary of the Interior delivered an address at the quarterly meeting of the Interstate Oil Compact Commission held in Grand Rapids, Mich., on August 10, 1946. In emphasizing the need for oil exploration and conservation, the Secretary said in part: "We must continue to increase and make available out knowledge of reservoir behavior, develop and utilize new techniques of exploration, and further the growing interest in secondary recovery operations of all types." (Reviews appeared in Oil & Gas Jour., vol. 45, No. 15, 1946, pp. 67-68, and Nat. Petrol. News, vol. 38, No. 33, 1946, pp. 41-44.) - V. S.

8925. Lovely, H. R. Geological Occurrence of Oil in United Kingdom with Reference to Present Exploratory Operations. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 9, 1946, pp. 1444-1516.

In the United Kingdom, oil indications occur over much of the stratigraphical column, particularly in Carboniferous and Jurassic rocks, and are commonly found in close and apparently genetic association with non-marine sediments. Suitable stratigraphical and structural conditions for oil pooling exist in southern England and east-central England, but widespread testing has proved commercial production only from the English equivalent of the lower Pottsville, Pennsylvanian system, in the latter region. It is concluded that the oil prospects of the United Kingdom are definitely restricted both stratigraphically and areally by reason of the geological factors which have together contributed to its development. More pools may be found but nothing of large dimensions is expected. - Author's abs., abridged by V. S.

8926. Lyon, Duane. Automatic Map-Plotting Instruments. Photogrammetric Engineering, Menasha, Wis., vol. 12, No. 3, 1946, pp. 315-340.

This paper deals with automatic map-plotting instruments of the Deville type developed in the United States, such as the original Deville Plotter, Cooke's Model 1, Stereotopograph, K. E. K. Plotter, Mahan Plotter, Multiscope, and Lyon Models 1, 2, and 3. The apparatus are described analytically with illustration by schematic drawings, and their general features are discussed as regards common characteristics, necessary geographical data, plotting accuracy and speed, control interval, and cost of compilation. In order to obtain the customary vertical accuracy, theoretically the flying height should not be greater than about two thousand times the desired contour interval, and the stereoscopic overlap not greater than 60 percent, but the present limitations of equipment and method generally make a ratio of 1,000:1 for interval to flying height necessary. - V. S.

8927. Military Service Publishing Co. Map and Aerial Photograph Reading - Complete. Harrisburg, Pa., 2nd rev. ed., 1945, 216 pp. Price $1.

This book aims to give complete directions on map and aerial-photo reading for field use conformable with the requirements of the U. S. Army. The contents comprise information from official Army manuals, and texts on foreign maps and map projections, with illustration by numerous drawings, different types of maps, aerial photographs, graduated protractors, and a photo-coordinate and grid-coordinate card. Some of the questions treated have a bearing on the use of geological maps and aerial photographs in prospecting. - V. S.

8928. Oppenheim, Victor. Geologic Outline of South American Oil Fields. Pan Amer. Inst. Min. Eng. & Geol., U. S. Sec., Tech. Paper 4, 1946, 35 pp

The geology and structure of the principal South American oil fields and sedimentary basins are outlined. The countries covered include Argentina, Chile, Uruguay, Paraguay, Bolivia, Brazil, Perú, Ecuador, Colombia, and Venezuela. Reference is made to the geophysical work performed.

In all, there are at present 13 major geological oil-bearing regions. About 90 percent of production comes from Tertiary formations of Pliocene to Eocene age. The greater part of the source rocks is also of Tertiary age. Structurally, the oil accumulations now developed are controlled mainly by Meso-Cenozoic Andean foldings. Future reserves can be expected along the Andean front ranges, in stratigraphic traps east of the Andes, and in some Tertiary coastal plains. A map of Tertiary basins and oil fields is given. - V. S.

8929. Peyton, Garland. Progress of Oil Search in Georgia. Oil Weekly, Houston, Tex., vol. 123, No. 3, 1946, pp. 92-96.

Exploration for oil and gas on the coastal plain of Georgia reached an all-time peak during 1945 and continued high in 1946. It has included geological and geophysical work, the latter being considered responsible for the selection of sites offering the greatest promise. The local geological problems and drilling results are discussed and illustrated by a geological map of Georgia, a west-east cross section through wells from Early County to Wayne County, and a generalized columnar section of the Georgia coastal plain. - V.S.

8930. Pratt, W. E. Petroleum on the Continental Shelves. (Abs.) Oil & Gas Jour., Tulsa, Okla., vol. 45, No. 27, 1946, p. 92.

The problem of petroleum resources on the continental shelf challenges first the geologist, then the engineer. The geologist's immediate and pressing responsibility is to review his accumulated knowledge of the character of the continental shelf and to measure the adequacy of the reward that awaits the conquest of petroleum under the submerged shelves. In reply to this challenge, it is submitted that if one of the normal functions of the earth has been the generation of petroleum, much greater volumes of it than are now believed to exist beneath the land areas should have been formed through the ages. The most likely place to search for these possible additional stores of petroleum is the continental shelf. (A brief summary appeared in Oil & Gas Jour., vol. 45, No. 28, 1946, p. 159.) - Abridged by V. S.

931. RCA Manufacturing Co. Bibliography on Supersonics. Victor Division, Camden, N. J., 1942(?), 52 pp. (mimeographed).

This bibliography lists technical papers and articles on supersonics published in a wide range of periodicals in the fields of physics, chemistry, biology, and engineering, in the English, French, German, Italian, and Russian languages, up to and including 1941. - V. S.

8932. Reed, J. C. Recent Investigations by U. S. Geological Survey of Petroleum Possibilities in Alaska. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 9, 1946, pp. 1433-1443.

In 1944-45, the U. S. Geological Survey conducted exploration of oil in Alaska. Three large regions were found promising: Gulf of Alaska area, the Alaska Peninsula-Cook Inlet area, and northern Alaska. Sources of oil are believed to exist, respectively, in Tertiary rocks, Triassic limestone, and Cretaceous rocks. The geology of the regions is outlined, and the chances of significant oil discoveries are discussed. The text is illustrated by sketch maps and photographs. - V. S.

8933. Rittenhouse, Gordon. Grain Roundness - A Valuable Geologic Tool. Bull. Am. Assoc. Petrol. Geol., Tulsa, Okla., vol. 30, No. 7, 1946, pp. 1192-1197.

The roundness of heavy minerals can be a valuable tool in oil and gas exploration and other geologic work. In the Appalachian Basin, roundness has been used to differentiate producing zones, outline petrographic provinces, and help to interpret geologic history. Examples are presented. - Author's abs.

8934. Scientific American. Shoran Maps. New York, vol. 175, No. 3, Sept. 1946, p. 110.

The U. S. Coast and Geodetic Survey is conducting tests of aerial short-range (shoran) mapping at Buckley Field, Colorado. In operation, a shoran-equipped plane sends 20 short-wave radio pulses per second to two ground stations; these transmit them back to the plane, producing visual signals on a cathode-ray screen in front of the operator. A third signal on the screen represents the plane. The operator adjusts the controls until the three signals merge into one, at which instant the exact distances to the ground stations are shown on two dials and are photographed by a camera. Simultaneously, another camera photographs the ground below. The combined records supply the data for drawing maps. Shoran accuracy in locating a point is estimated to be within 10 feet over a range of 300 miles. - V. S.

8935. Varnes, D. J. Geologic Mapping by Means of Graphic Locator. U. S. Geological Survey, Washington, D. C., Circular 12, 1946, 6 pp.

The graphic locator simplifies field work in geological mapping. It consists of a rectangle of xylonite about 3 inches square with two scales marked on the under side. Used in conjunction with a surveying alidade, this instrument eliminates the need of a stadia rod in determining the position of any point on a topographic map, so that points inaccessible with a rod can be located, and the mapping of loose surface material can be expedited accurately and rapidly. The degree of accuracy possible in determining position and the inherent errors are discussed, and the procedure of using the locator is illustrated by an example. - V. S.

8936. Wiener, P. F. German for the Scientist. Chemical Pub. Co., Brooklyn N. Y., 1946, 238, pp. Price, $3.50.

This is the type of book needed by scientific students and research workers who desire to obtain, in as brief a period as possible, a reading knowledge of German scientific literature for research, development, or engineering work. It has a simple and direct method of approach without too much entangling grammer.

Part 1 gives a brief summary of grammatical and construction difficulties, and the elements of scientific German, with useful hints to avoid these difficulties. Parts 2 and 3 embrace passages from scientific literature, chiefly from physical and chemical works, but of broad scientific value. Part 4 contains the translations of the passages in parts 2 and 3. A 33-page vocabulary is at the end. - Econ. Geol., vol. 41, No. 5, 1946, p. 558.

8937. Zeuner, F. E. Dating the Past: An Introduction to Geochronology. London, Methuen & Co., 1946, 444 pp. Price, $6.90.

This book represents a first attempt to combine the diverse geological, botanical, zoological, and physical methods of dating the past into one discipline, geochronology. The tree-ring analysis, varved-clay analysis, astronomical theory of the ice-age, and other approaches are considered. One section is devoted to a brief review of radioactive methods; a diagram shows the results of the lead method. Another section deals with the duration of geological periods and the time-rates of geological processes. The chronological findings obtained by the different methods are summarized in numerous tables. - V. S.

8938. ZoBell, C. E. Functions of Bacteria in the Formation and Accumulation of Petroleum. Oil Weekly, Houston, Tex., vol. 120, No. 12, 1946, pp. 30-34.

The API Research Project 43A at the Scripps Institution of Oceanography, California, is aimed at determining the conditions of petroleum formation with a view to aiding oil exploration. The method consists in studying stratigraphically the transformation of organic matter in recent marine sediments, particularly that produced by bacteria. The results to date show that there are several ways in which bacteria may have been instrumental in the formation nd accumulation of oil. (1) Bacteria produce hydrocarbons and hydrogen; the atter may contribute to the hydrogenation of organic matter, to methane ormation, and to sulfate reduction. (2) Bacteria of the lipolytic variety ydrolyze fats and convert fatty materials into substances closer to the ydrocarbon type. (3) Certain bacteria attack and modify crude oil by the referential oxidation or transformation of petroleum hydrocarbons. (4) inally, bacteria create reducing conditions in sediments and liberate oil rom their surfaces. These activities contribute in different ways to the ormation, preservation, transformation, and accumulation of oil. Some of he processes are outlined. - V. S.

10. PATENTS

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8939. (1) Inrichting voor het meten van de verticale componente van den zwaartekracht. (Device for Measuring the Vertical Component of the Force of Gravity.) Standard Oil Development Co., New Jersey. Dutch Patent 49,362, issued October 15, 1940.

A gravimeter, comprising a body with a vertical and a horizontal arm attached thereto, provided with weights, which is supported rotatably about a shaft perpendicular to the arms. The body is freely carried by two spiral springs adjustably located in the axis of rotation. A spring is provided for returning the system to a position of equilibrium, whose measured tension or torsion is an index of the force of gravity. Two fixed points are arranged, allowing a limited movement of arms between them, with the position of equilibrium included. - Claims allowed, 3.

8940. (2) Method for Locating Permeable Formations Traversed by Boreholes. J. E. Walstrom, Houston, Tex., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,401,280, issued May 28, 1946.

A process for locating permeable formations traversed by an uncased bore hole containing a column of liquid, comprising adding to the bore-hole liquid a substance having magnetic properties whose presence can be detected readily, maintaining a sufficiently high hydrostatic pressure in the bore hole to cause said liquid to invade permeable formations traversed by said bore hole, and deposit at said permeable formations a higher concentration of said substance than at other zones along said bore hole, and moving along said bore hole a device for detecting magnetic phenomena to locate the formations having such higher concentrations of said substance. - Claims allowed, 6.

8941. (2) Means for Installing Magnetic Detecting Devices and Supports Therefor. J. F. G. Miller, South Arlington, Va., and Richard MacHenry, Washington, D. C. U. S. Patent 2,405, 595, issued August 13, 1946.

A device of the character disclosed for arranging a magnetometer support within the bed of a body of water, said support having an aperture therein, the combination of a tubular member sealed at the upper end thereof and having a water inlet connected thereto, means for detachably securing said support in sealed relation to said tubular member, means for forcing water through said inlet and through said aperture within the support thereby to cause the support to be embedded within the bed of said body of water to a predetermined depth with the axis of the support vertical, and means operable at will from the surface of the water for detaching the tubular member from said support without disturbing the axis of the support from the vertical or changing the depth to which the support has been embedded within said bed. - Claims allowed, 14.

8942. (3) Method of Seismic Surveying. Conrad Reichert, San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex. U. S. Patent 2,384,851, issued September 18, 1945.

A method of propagating seismic waves in subsurface surveys, which includes the steps of locating a solid explosive charge and a blasting cap in a shot hole of substantial depth, plugging the hole adjacent the upper end only, so as to leave the major portion of the hole above the charge unobstructed, and firing the cap, whereby ejection of solid material from the hole by the exploding charge is delayed for a period which is at least sufficient to permit the reception and recording of the significant seismic impulses prior to the reception of disturbances resulting from such ejection, and whereby the hole may readily be cleared for the loading therein of another explosive charge. - Claims allowed, 1.

8943. (3) Seismic Apparatus and Method. O. S. Petty, San Antonio, Texas. U. S. Patent 2,408,478, issued October 1, 1946.

In a portable seismometer of the type employing elements which are readily displaceable on application thereto of seismic wave energy, in combination, a housing, an element rigidly supported in the housing, a second element supported in the housing for movement relative to said first element, and means mounting said second element to permit such relative movement, said means including a steady-mass carrying said second element, said steady-mass being hinged to the housing on an axis laterally spaced from said elements, the hinged axis being disposed substantially in the horizontal plane containing the center of gravity of the steady-mass, whereby the seismometer is unresponsive to horizontal components of seismic waves. - Claims allowed, 19.

8944. (4) Method and Apparatus for Simultaneous Determination of Various Properties of the Subsoil. C. B. Aiken, North Plainfield, N. J., assignor to Schlumberger Well Surveying Corporation, Houston, Tex., a corporation of Delaware. U. S. Patent 2,398,761, issued April 23, 1946.

A method of investigating simultaneously a plurality of different subjects f interest in a bore hole, which comprises producing a first group of supermposed alternating currents of different frequencies at the surface of the arth, transmitting said superimposed currents to a given location in the bore ole, utilizing said superimposed alternating currents at said location in the ore hole to provide a group of superimposed alternating-current values which re different in frequency from each other and from the currents of said first roup and each of which is a function of a subject under investigation, ransmitting said group of superimposed alternating-current values to the urface of the earth, and separately obtaining indications of each of the lternating current values in said group. - Claims allowed, 17.

8945. (4) Electric Ratiometer. E. C. Klepp, Cricklewood, London, England, assignor to S. Smith & Sons (England), Limited, a British Company. U. S. Patent 2,400,308, issued May 14, 1946.

A moving-coil electric instrument comprising two magnet poles spaced apart, a core disposed between the poles so as to provide gaps between it and the poles, two coils arranged side by side and encircling said core with their side stretches in said gaps, a rotatable mounting for said coils arranged to permit rotation of said coils about an axis substantially parallel to the plane of the coils, which coils are wound so as to transmit opposing torques to said mounting, which core is provided with a cylindrical outer surface having its axis coincident with the axis of rotation of the coils, and provided with a second surface so intersecting said cylindrical surface that the axial depth of the latter varies around its circumference, whereby varying lengths of the side stretches of the coils cut the magnetic field in moving through said gap. - Claims allowed, 5.

8946. (4) Method of and Apparatus for Investigation of Cased Drill Holes. Jacob Neufeld, Tulsa, Okla., assignor to Well Surveys Incorporated, Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,400,593, issued May 21, 1946.

An electrical process for determining the nature of the geological formations traversed by cased drill holes comprising transmitting electrical current through the earth between casings of two drill holes and determining the distribution of the said current as a measure of the varying character of the formation traversed by the drill holes. - Claims allowed, 7.

8947. (4) Well-Logging Apparatus. R. L. Doan, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Delaware. U. S. Patent 2,404,622, issued July 23, 1946.

In apparatus for electrically surveying a bore hole, the subcombination of a fluid-tight housing, having an inwardly tapered hole formed in its wall, an electrode band around the housing, covering the hole, an electrical connection from the electrode to the inside of the housing comprising a plug tapered to correspond to the taper of the hole and a spring between the electrode and the plug, and electrical insulating material between the electrode and the wall, and between the plug and the wall forming the walls of the hole, at least the insulating material between the plug and the wall forming a fluid-tight seal. - Claims allowed, 1.

8948. (4) Electrical Prospecting Apparatus. C. B. Bazzoni, Wallingford, Pa., and J. W. Millington, Beaumont, Tex., assignors to Sperry-Sun Well Surveying Co., Philadelphia, Pa., a corporation of Delaware. U. S. Patent 2,408,029, issued September 24, 1946.

Means for determining the location and character of strata penetrated by a bore hole comprising a circuit including a coil, a condenser in parallel with the coil, and also in parallel therewith a circuit branch including a second coil and second condenser in series, one of said coils being an exploratory coil movable along said bore hole, and means for establishing through said circuit and exploratory coil in the strata adjacent the bore hole a high-frequency alternating current. - Claims allowed, 3.

8949. (4) Inrichting voor het langs electrishen weg onderzoeken van aardlagen en in het bezonder van petroleumhoudende en waterhoudende lagen, die door een boorput worden doorsneden. (Device for Electrically Studying Earth Formations, Especially Oil-Bearing and Water-Bearing Formations, Traversed by a Borehole.) Société de Prospection Electrique, Procédés Schlumberger, Paris. Dutch Patent 49,596, issued November 15, 1940.

The device consists of a circuit formed by a current source, and conductors connecting this source with two electrodes, at least one of which is located in the borehole near the level of the formations to be studied. The device also has another separate measuring circuit formed by a measuring instrument and conductors connecting this instrument with two electrodes, one of which likewise is located in the borehole near the level of the formations studied. The elctrodes of the two circuits located in the borehole are connected. - Claim allowed, 1.

8950. (5) Radiation Detector. D. G. C. Hare, Roslyn, N. Y., assignor to The Texas Co., New York 17, N. Y., a corporation of Delaware. U. S. Patent 2,397,661, issued April 2, 1946.

A radiation detecting device comprising a casing, a plurality of plates disposed in said casing in separated relation and connected together electrically to form a cathode member, each plate being provided with at least one hole, and the holes in the plates being disposed in alignment, an anode member omprising a wire extending through said aligned holes and insulated from said athode plates, and a gaseous filling in said housing, said filling comprising mixture of argon and petroleum ether. - Claims allowed, 6.

8951. (5) Radiation Detector. D. G. C. Hare, Roslyn, N. Y., assignor to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,398,934, issued April 23, 1946.

A device for detecting gamma radiation comprising a cylindrical cathode member, an anode member formed by a wire passing axially through said cylindrical member, and a plurality of separated plates extending laterally and externally of said cylindrical member. - Claims allowed, 6.

8952. (5) Radiographic Exposure Meter. Herbert Friedman, Arlington, Va. U. S. Patent 2,405,572, issued August 13, 1946.

A Geiger-Mueller tube for comparing hard radiation of unknown intensity with hard radiation of a known intensity, comprising a radiation-permeable tubular member forming a cathode, an anode extending axially therethrough, insulating disks closing the ends of said cathode, thereby defining an active tube volume, a radiation permeable envelope for said anode, cathode, and disks, and means for exposing the active volume defined by the cathode of said tube to a source of constant radiation impinging on said tube from a direction substantially coaxial with the tube axis. - Claims allowed, 4.

8953. (6) Temperature Sensitive Means. C. F. Kettering, Detroit, Mich., assignor to General Motors Corp., Detroit, Mich., a corporation of Delaware. U. S. Patent 2,399,640, issued May 7, 1946.

In detecting means, a plurality of target and thermocouple means arranged in quadrants on each side of both a horizontal and a vertical axis, two of the diagonal targets having a plurality of thermocouples attached thereto, conductive means connecting thermocouples in adjacent quadrants in series, and further conductive means crossconnecting the thermocouples on the other diagonal targets to give a potential difference across different terminals for a horizontal or a vertical temperature gradient or combination of the two. - Claims allowed, 3.

8954. (7) Method for Determining Combustible Gases in Gas Mixtures. Reinhold Weber, Kassel Kirchditmold, Germany; vested in the Alien Property Custodian. U. S. Patent 2,399,965, issued May 7, 1946.

The method of determining the quantity of hydrocarbons in gas mixtures by catalytic filament resistance comparison, which method consists in heating such a filament to a high temperature and passing the hydrocarbon laden gas mixture over said filament in a confined stream, whereby said hydrocarbons are burned, and simultaneously measuring the electrical resistance of said filament, and passing the gaseous products of combustion and residual unburned gases over said filament and again simultaneously measuring the filament resistance, whereby a comparison of the two measurements will indicate the quantity of the sought hydrocarbons. - Claims allowed, 3.

8955. (7) Mud Logging System. F. E. Hummel, Ojai, Calif., assignor to Shell Development Co., San Francisco, Calif., a corporation of Delaware. U. S. Patent 2,400,046, issued May 7, 1946.

An apparatus for continuously sampling a drilling fluid circulating in a well-drilling installation, comprising a closed separator, inclined conduit means in communication with the separator at the upper end, the lower end of the conduit means being adapted to be disposed in the open drilling fluid return discharge, a supply of diluting fluid, pipe means in communication between said supply and said conduit means for injecting a jet of said diluting fluid from said supply into said conduit means concurrently with the sample stream entering said conduit means, and pressure control means in said pipe means for maintaining the pressure of said diluting fluid jet at a constant value, whereby the delivery of the drilling fluid sample stream to the separator is effected at a constant rate. - Claims allowed, 3.

8956. (7) Method for Determining the Petroleum Hydrocarbon Content of Earth Samples. C. B. Brown, McAllen, Tex. U. S. Patent 2,403,631, issued July 9, 1946.

The method of exploring for subterranean petroleum deposits, which consists in preparing a solution containing a plurality of dissolved hydrocarbons of a measured quantity of an earth sample, subjecting a measured quantity of said solution to an ultraviolet radiation, passing the fluorescent light emanating from said solution through a plurality of spectral filters in succession, each of said filters corresponding respectively to one of a plurality of different bands of the spectrum, measuring the intensity of fluorescent light in each one of said spectral bands respectively, and comparing the measured intensity of the fluorescent light in each spectral band with each of a plurality of empirical charts in succession respectively, each of said charts corresponding to hydrocarbons of different known concentrations. - Claims allowed, 3.

8957. (7) Geochemical Prospecting Method. H. T. Kennedy, Oakmont, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware. U. S. Patent 2,406,611, issued August 27, 1946.

A method of prospecting a region of the earth for subterranean gas and oil deposits which comprises taking samples of ground water in the earth at a plurality of spaced points in the region, at levels adjacent the water table, said ground-water samples being free from significant quantities of soil, confining the samples from access to air before substantial diminution of thane concentration therein, and thereafter quantitatively determining traces f ethane dissolved in the samples as indicative of the presence of oil or gas. Claims allowed, 2.

8958. (8) Apparatus for Well Logging. W. L. Russell, Tulsa, Okla. U. S. Patent 2,398,562, issued April 16, 1946.

In a surveying device for recording characteristics of the formations traversed by a bore hole, a caliper tool adapted to being lowered into said bore hole, said tool having pairs of contiguous arms mounted for independent movement in radial planes extending through the axis of said bore hole, said arms having blunt and sharp contact portions, respectively, and adapted to contact contiguous areas of the wall of the bore hole to engage the surface of said formations, and mechanism connected with said arms for recording the relative movements thereof. - Claims allowed, 9.

8959. (9) Tridimensional Radio Navigational System. E. G. Gage, Brooklyn, N. Y., assignor of two-thirds to Leon Ottinger, New York, N. Y. U. S. Patent 2,399,671, issued May 7, 1946.

A radio navigational system comprising a single transmitter of electromagnetic waves, including a pulse generator having a straight-line modulation characteristic, a plurality of direction-finding means for the electromagnetic waves remotely located with respect to the transmitter thereof and positioned respectively in predetermined relationship to an observation point, each of said direction-finding means being tuned to the said transmitter, and including two directional receiving elements located at a predetermined angle to each other and means to tune both receiving elements to the radiated frequency, together with two translation means operatively associated with the respective receiving elements and tuning means, the whole affording two substantially identical receiver channels, cathode-ray tube means operatively coupled to said receiver channels and having a viewing screen including an indicating scale, whereby the received energy produces a plurality of divergent linear traces adapted for cooperation with said scale. - Claims allowed, 48.

8960. (9) Time Cycle Telemetering. Daniel Silverman, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware. U. S. Patent 2,400,170, issued May 14, 1946.

An electrical telemetering system for transmitting signals through a transmitting medium, the duration of said signals indicating desired information, comprising means for supplying electric current to points in said medium for transmission therethrough, means for intermittently and recurrently varying at least one known characteristic of said electric current to form at least two signals having different characteristics, means responsive to an electrical resistance which varies as a function of the information desired for controlling the duration of at least one of said signals, the duration of at least one other of said signals being uninfluenced by the desired information, and means for receiving said signals and for producing an indication of the duration of said signals. - Claims allowed, 14.

8961. (9) Well Sounding Microphone. J. T. Kremer, Houston, Tex., assignor to The Texas Co., New York, N. Y., a corporation of Delaware. U. S. Patent 2,403,535, issued July 9, 1946.

A microphone adapted to respond to pressure waves passing through a gaseous medium in a conduit under relatively high pressure, comprising a tubular housing closed at one end and connected at its open end to said conduit, a body member, a pair of disks at opposite sides of said body member, a diaphragm secured at the outer face of one of said disks to provide an air-tight chamber between the diaphragm and disk, a compressible member mounted at the rear of the other disk, a duct connecting the interior of said compressible member with said chamber, said body member and disks being mounted in said housing so that the peripheries of the disks fit snugly against the inner surface of said housing with the diaphragm facing said conduit and the peripheries of said disks being provided with apertures to permit said gaseous medium to surround and compress said compressible member to force air therefrom through said duct to said chamber so as to equalize pressure on opposite sides of said diaphragm. - Claims allowed, 2.

8962. (9) Distance and Direction-Determination System. Irving Wolff, Merchantville, N. J., assignor to Radio Corporation of America, a corporation of Delaware. U. S. Patent 2,407,198, issued September 3, 1946.

An object detector including, in combination, means for radiating pulses of radio frequency energy, a superheterodyne device, including a local oscillator for receiving said energy after reflection from the object to be detected, means for making the local oscillator of said receiving device oscillate at continuously varying intervals after the radiation of each of said pulses, a second means synchronously varying at said continuously varying rate, and means including said device for indicating the respone to said reflected energy. - Claims allowed, 21.

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